Rising Occupational and Industry Mobility in the United States: 1968-1997[*]

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Abstract

We document and analyze the high level and the substantial increase in worker mobility in the United States over the 1968-1997 period at various levels of occupational and industry aggregation. This is important in light of the recent findings in the literature that human capital of workers is largely occupation- or industry-specific. To control for measurement error in occupation and industry coding, we develop a method that utilizes the Retrospective Occupation-Industry Supplemental Data Files, newly released by the Panel Study of Income Dynamics. This allows us to obtain the most reliable estimates of occupational and industry mobility levels available in the literature. We emphasize the importance of these findings for understanding a number of issues such as the changes in wage inequality, aggregate productivity, job stability, and life-cycle earnings profiles.

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1   Introduction

Recent research by Kambourov and Manovskii (2002) has documented substantial returns to occupational tenure: everything else being constant, 5 years of occupational experience are associated with an increase in wages of at least 12%. This finding is consistent with human capital being specific to the occupation in which an individual works (e.g., truck driver, accountant, chemical engineer). In earlier papers, Neal (1995) and Parent (2000) have argued that human capital may be specific to the industry of employment (e.g., colleges and universities, trucking services, banking). Since these results imply that a substantial amount of human capital may be destroyed upon switching occupation or industry, studying the levels and trends in occupational and industry mobility is important for understanding various macro and labor economic phenomena. Despite this, the issue has not been addressed in the literature in a satisfactory way.

This paper addresses this deficiency. We present the facts that characterize occupational and industry mobility in the United States. We expect that these facts will be important in guiding future theoretical work on worker mobility. There are two main messages of the paper: (1) occupational and industry mobility in the United States is high, and (2) it has increased significantly since the late 1960s.

For most of the analysis we use data from the Panel Study of Income Dynamics (PSID), which contains annual descriptions of occupation and industry affiliation for a panel of individuals representative of the population of the United States in each year. We define occupational mobility as the fraction of currently employed individuals who report a current occupation different from their most recent previous report of an occupation.[1] Industry mo-

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[1] For example, an individual employed in two consecutive years would be considered as switching occupations if she reports a current occupation different from the one she reported in the previous year. If an individual is employed in the current year, but was unemployed in the previous year, a switch in his occupation will be recorded if he reports a current occupation different from the one he reported when he was

bility is defined similarly. Using these definitions, we find that among male workers over the 1968-1997 period:

1. The average level of occupational mobility is around 13% at the one-digit level, 15% at the two-digit level, and 18% at the three-digit level.[2] The corresponding numbers are 10%, 11%, and 12% for industry mobility. As discussed below, these are the most reliable estimates of mobility levels in the literature.

2. Occupational mobility has increased from 10% to 15% at the one-digit level, from 12% to 17% at the two-digit level, and from 16% to 20% at the three-digit level. The corresponding increases in industry mobility are 7% to 12%, 8% to 13%, and 10% to 13%, respectively.

3. Occupational and industry mobility rates decline with worker's age and education.

4. Occupational and industry mobility has increased for most age-education subgroups.

5. The fact that the population has become older and more educated over the period suggests that the slow down in the rise in mobility, especially in the 1980s, may be due to demographic changes. If we reweigh the sample to keep the population structure throughout the period the same as in 1980, then we find an increase in occupational mobility from 11% to 16% at the one-digit level, from 13% to 18% at the two-digit level, and from 17% to 23% at the three-digit level.

6. Net occupational mobility, defined as one-half of the sum of the absolute changes in occupational employment shares, has increased from 1% to 3% at the one-digit level, from 3% to 6% at the two-digit level, and from 9% to over 13% at the three-digit level.

most recently employed.

[2]Appendix I contains the description of the detailed three-digit occupation and industry codes. These codes may be aggregated into two- and one-digit codes as described in Appendices II and III.

7. The increase in occupational mobility was not driven by an increased flow of workers into or out of a particular one-digit occupation.

8. Occupational mobility of government workers is relatively low and has *declined* from 10% to 6% at the two-digit level.

9. Occupational and industry switches are fairly permanent: around 30% of the workers switching occupations (industries) return to their one-digit occupation (industry) within a four-year period after the switch while only 20% return to their three-digit occupation (industry) within that period.

10. Occupational mobility is mildly procyclical. Net occupational mobility is countercyclical.

We continue by suggesting how the findings in this paper help shed light on four actively researched issues in macro and labor economics. In particular, we outline the relationship between occupational mobility and the concept of economic turbulence, the job stability and job security debate, the increase in wage inequality since the early 1970s, and the flattening life-cycle earnings profiles.[3]

A number of researchers, following Bertola and Ichino (1995) and Ljungqvist and Sargent (1998), have described the 1970s and the 1980s as a period of increased economic turbulence. The increase in turbulence is defined as an increase in the rate of skill depreciation upon a job switch. Identifying this increase in the data, or finding other evidence of the increased tur-

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[3]We spend relatively more time documenting the facts on occupational mobility. In Kambourov and Manovskii (2002) we found large returns to experience in worker's occupation and very small returns to worker's industry experience. This result is consistent with human capital being occupation- rather than industry-specific. This suggests that occupational mobility is likely more closely linked with the accumulation and destruction of human capital. The findings on industry mobility are interesting in their own right, however, since worker mobility across industries may help one think about the implied variability of demands for goods and services produced by various industries.

bulence, has proved elusive. Our results suggest that an observable increase in occupational mobility over the period may serve as a manifestation of the increased turbulence.

In recent years there has been substantial interest, both in the popular press and among researchers, in whether the job stability and job security of American workers has declined. Anecdotal evidence and surveys of worker perceptions suggest that stability and security declined in the 1980s and 1990s. It turned out to be difficult, however, to find a substantial increase in job (employer) mobility in the United States over the last three decades (see Journal of Labor Economics (1999) special issue). The results presented in this paper suggest that it may be appropriate to reinterpret workers' feeling of insecurity as a realization that they are now more likely to switch occupations. In addition, we find that a bigger fraction of the three-digit occupation and industry switches in the early 1990s involves a switch at the aggregated one-digit level than in the 1970s. This indicates that an occupation or industry switch in the 1990s may represent a more fundamental career change.

Despite an active search by economists for the reasons behind a large increase in wage inequality among male workers in the United States over the last 30 years (an increase of 6.6 Gini points, or 25% from the late 1960s to the early 1990s), the culprit is still at large. An enormous literature was developed, mainly devoted to accounting for the rise in the college premium (e.g., Krusell, Ohanian, Ríos-Rull, and Violante (2000) among many others). The increase in the college premium, however, accounts for less than a third of the overall increase in inequality. Over half of the increase was due to rising wage inequality within narrowly defined age-education subgroups of the population (e.g., Juhn, Murphy, and Pierce (1993)).

Kambourov and Manovskii (2004c) suggest that a substantial part of the variance of wages for individuals from the same age-education group is accounted for by the heterogeneity of their occupational experience. Further, they show in a general equilibrium model with

occupation-specific human capital that the increase in the variability of productivity (or demand) shocks to occupations from the 1960s to the 1990s, calibrated to the facts documented in this paper, accounts for over 80% of the increase in within-group wage inequality.

Knowledge of the patterns of occupational mobility elucidates the determinants of the observed age-earnings profiles. It has been documented that these profiles have become flatter for each successive cohort entering the labor market during the period we study (see Kambourov and Manovskii (2004a) for the evidence and a review of the related literature). The increase in occupational mobility, coupled with the occupational specificity of human capital, provides a possible explanation of this finding. A substantial part of the increase in the average life-cycle earnings profile is driven by an increased average occupational experience. Thus, when the average occupational experience is not rising so fast (because of more frequent occupation switches), the cohort profile of earnings is expected to be flatter.

Turning to a discussion of data issues, we note that the PSID is particularly convenient for the study of the trends in mobility over time, since it - unlike any other US data set - provides consistent occupation and industry codes throughout the 1968-1997 period. It is well known that panel data on occupation and industry affiliation are characterized by a substantial amount of noise. In 1999, the PSID released the Retrospective Occupation-Industry Supplemental Data Files (Retrospective Files hereafter) that recoded the reported occupations and industries for the period 1968-1980. Exploiting the differences between the methodology employed by the PSID in constructing the Retrospective Files and the one employed in the original coding of the occupation and industry affiliation descriptions allows us to minimize the error in identifying true industry and occupation switches. We document that approximately 50% of occupation or industry switches identified on the uncontrolled data are not genuine and are the result of coding error. By reducing measurement error, we

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overcome the problem that plagued earlier attempts at identifying the levels of occupational and industry mobility.

The related literature on occupational and industry mobility is very limited. Moscarini and Vella (2003) in a recent paper have documented the behavior of occupational mobility at the three-digit level in the United States using data from the March Current Population Survey over the 1976-2000 period. Their findings are broadly consistent with ours for the overlapping period in the samples. Owing to the limitations of the March CPS, their analysis misses the biggest part of the increase in three-digit occupational mobility that took place in the first half of the 1970s. We discuss some of the relevant differences between the PSID and March CPS below.[4] In another related paper, Parrado and Wolff (1999) use the PSID and find an increase in one-digit occupational and industry mobility between the 1970s and the 1980s. Their analysis, however, is quite limited in scope and is based on the error-ridden originally coded occupation and industry affiliation data. We refer to their findings when relevant below. In an earlier work, Rosenfeld (1979) reports that occupational mobility was constant in the 1960s. This suggests that the significant increase in mobility that we find in this paper was specific to the period we study.

The paper is organized as follows. In Section 2 we describe the data and document the differences between the originally coded occupation and industry affiliation data and the codes contained in the Retrospective Files. We provide evidence that the data from the Retrospective Files are more reliable. We then develop a method for controlling for measurement error that allows us to identify precise levels and trends in occupational and industry mobility over the period. This procedure, together with the patterns of mobility - overall and for various age-education subgroups of the sample - is reported in Section 3. In Section 4 we show that our findings of high and increasing mobility are robust to numerous

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[4]See Kambourov and Manovskii (2004b) for an in-depth discussion.

modifications of the sample and the procedure used to control for measurement error. In Section 5, we present a number of facts that help distinguish among various theories of occupational and industry mobility. We conclude in Section 6.

2 The Data

2.1 Sample Restrictions

The data we use come from the PSID for the 1968-1997 period.[5] The main sample consists of male heads of household, aged 23-61, who are not self- or dual-employed and are not working for the government. The resulting sample consists of 64,993 observations over the 1968-1997 period, with an average of 2,166 observations a year. Restricting the sample to household heads is necessitated by the availability of occupation and industry affiliation data. This restriction does not affect our results significantly, since most workers in the PSID who satisfy our other sample selection criteria are indeed household heads. Workers younger than 23 are excluded because, in this paper, we are more interested in switches that entail human capital losses than in the early career search process. Evidence provided below, however, demonstrates that the exclusion of young workers, women, and self- or dual-employed workers does not significantly affect the results on the level and trend of aggregate mobility. The exclusion of government workers, however, is less innocuous, since occupational and industry mobility of government workers has declined substantially over the period - an issue that we discuss in-depth below.

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[5]After 1997 the PSID switched to a new procedure in which individuals are interviewed once every two years. This makes it difficult to use the 1999 and 2001 data in studying trends and cycles in mobility.

2.2 Occupation and Industry Affiliation Data: Original vs. Retrospective Coding

The PSID has used the 1970 Census occupation and industry codes from 1968 on. However, one-digit occupation codes were used in 1968-1975, two-digit occupation codes in 1976-1980, and three-digit occupation codes after 1981. The industry affiliation was coded at a two-digit level in 1971-1980 and at a three-digit level after 1981.

In 1996 the PSID started working on the 1968-1980 Retrospective Occupation-Industry Files. This work originated as part of the Working Lives and Mortality in an Aging National Cohort project. That project required three-digit occupation and industry codes throughout the course of the PSID. As mentioned above, the PSID did not originally code occupations and industries at the three-digit level prior to 1981. To produce the three-digit recode, the PSID pulled out paper materials from its archives containing the written records of the respondents' descriptions of their occupations and industries. These same records were the basis on which the one- and two-digit occupation and industry codes were assigned prior to 1981. Using these records, the PSID assigned three-digit 1970 Census codes to the reported occupations and industries of household heads and wives for the period 1968-1980.[6] The work was completed in 1999, when the PSID released the Retrospective Occupation-Industry Supplemental Data Files.

Using the Retrospective Files, we create a series of consistent three-digit occupational codes that runs from 1968 till 1997. These codes can also be aggregated into two- and one-digit codes. Surprisingly at first, we find a significant degree of disagreement between the originally assigned PSID occupation and industry codes and the codes assigned to the same

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[6]The PSID has recoded occupations and industries for most household heads and wives in the sample but not all. The analysis below is performed on weighted data. With our sample restrictions, among individuals who appear more than twice in the sample, only 82 observations with positive PSID sample weights were not recoded. These non-recoded observations do not exhibit a trend over time and have virtually no impact on the average sample characteristics.

individuals in the Retrospective Files. Consider, for example, the one-digit occupational mobility for the 1969-1980 period. During this period, the PSID provides the originally assigned occupation (industry) codes as well as the codes reassigned in the Retrospective Files. One would expect the levels of occupational mobility computed on these two series to be similar, if not exactly the same, since both are based on the same raw information: the respondent's description of his or her occupation contained in the PSID interview records. Any difference must come from the way the original information contained in those records was transferred into an occupation code. One finds, however, that the level of occupational mobility in the Retrospective Files during the 1969-1980 period is roughly two times smaller, at approximately 11%, than the mobility obtained on the originally coded occupations which is approximately 22%. These two series are plotted as dotted lines in Figure 1.

Why is occupational mobility so much lower when computed using the Retrospective Files? We argue that the difference between the originally and the retrospectively assigned occupation and industry codes was caused by differences in the methodology employed by the PSID in constructing these data. When originally coding the occupation (industry) data, the PSID coder could not compare the current year description to the one in the previous year. As a result, for a respondent who is in the same occupation (industry) in both years, similar occupational (industry) descriptions could end up being coded differently. This was not the case with the constructed Retrospective Files, where, as reported in the PSID (1999), "to save time and increase reliability, the coder coded all occupations and industries for each person across all required years before moving on to the next case." Thus, in constructing the Retrospective Files, the coders had access not only to the respondents' description of their current occupation (industry) but also to the description of their past and future occupations (industries). This allowed them to compare these descriptions, decide whether

they are similar, and assign the same occupational (industry) code where appropriate.

Our hypothesis is supported by the results of an experiment summarized in Mathiowetz (1992). Reports of occupations obtained in interviews of employees of a large company were checked against company records. This was done in two ways. First, the coders were asked to compare simultaneously the two descriptions and to code them as being in agreement if the two sources could result in the same three-digit classification. The procedure resulted in a disagreement rate of 12.7%. Second, the coders independently coded the two descriptions at the one- and three-digit levels. The comparison of the independently assigned codes resulted in a disagreement rate of 48.2% at the three-digit level and 24.3% at the one-digit level. The results indicate that by far the largest amount of error in occupational or industry affiliation data is generated at the coding stage.[7]

The discussion above suggests that the occupation and industry codes from the Retrospective Files are more reliable and that there is a higher degree of misclassification of occupations and industries in the originally coded data. Kambourov and Manovskii (2002) show that the Retrospective Files are indeed much more reliable than the originally coded data.[8]

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[7]In a related paper Mellow and Sider (1983) find that a direct comparison of independently coded individual responses to the CPS with employer records yielded an agreement rate of only 92.3% and 81% for one-digit industries and occupations, respectively, and 84.1% and 57.6% for three-digit industries and occupations, respectively.

[8]Our use of the Retrospective Files for the first time allows us to reconcile differences in occupational and industry mobility obtained using various U.S. data sets. Annual occupational mobility obtained using the National Longitudinal Surveys (NLS) or matched Current Population Survey (CPS) is similar to the one obtained using the originally coded PSID data and is consequently characterized by a large amount of noise. In the case of the NLS, this happens because NLS coders do not have access to last year's description of the respondent's occupation or industry when they code this year's affiliation. Despite the use of a "dependent coding" technique by the CPS, introduced in an effort to reduce coding error, the descriptions of occupations in the two periods are still coded independently from each other for a large fraction of the sample. Occupational mobility obtained from the March supplement to the Current Population Survey (March CPS) is closer to the one we obtain on the PSID Retrospective Files. As argued in Kambourov and Manovskii (2004b), however, this happens because the March CPS measures mobility over a much shorter period than a year, not because the amount of noise generated by independent coding of the current and last year's occupational descriptions is reduced.

3 Occupational and Industry Mobility in the United States

This section contains the main result of the paper. In particular, we document the levels and trends in occupational and industry mobility in the United States using the data from the Retrospective Files for the 1968-1980 period and the originally coded data for the 1981-1997 period. The use of the Retrospective Files allows us to minimize the measurement error in occupation and industry coding.

3.1 Methodology

As discussed above, the level of occupational mobility after 1981 obtained from the originally coded data is substantially higher than the one before 1980 obtained from the Retrospective Files. As is suggested by Figure 1, the presence of coding error in the originally coded data causes an affine shift in the plot of mobility relative to that obtained on the Retrospective Files (we test this formally below in Section 4.2). Thus, to control for the effects of the change in the coding procedure in 1981, we adopt the following procedure.

We divide the sample into 26 age-education categories. By age, individuals are divided into 13 three-year age groups, starting with age 23. Thus, the variable *Age* that we use below takes values from 1 to 13. By education, individuals are divided into those who have 12 years of education or less and those who have more than 12 years of education. We do not use a finer age-education partition, since this would lead to some groups having too small sizes in some years. We postulate the following model:

$$P_{it} \equiv Pr(y_{it} = 1|X_{it}) = E(y_{it}|X_{it}) = \xi(X_{it}\beta), \tag{1}$$

where

$$X_{it}\beta = \beta_0 + \beta_1 Age + \beta_2 Age^2 + \beta_3 Time + \beta_4 Unemp + \beta_5 Break \tag{2}$$

$$+\beta_6 Time * Age + \beta_7 Unemp * Age + \beta_8 Break * Age$$

$$+\beta_9 Time * Age^2 + \beta_{10} Unemp * Age^2 + \beta_{11} Break * Age^2.$$

In this specification, y_{it} is a binary variable that assumes the value of one if individual i switches her, say, occupation in period t and is zero otherwise. Our analysis will be based on the probit specification $E(y_{it}|X_{it}) = \Phi(X_{it}\beta)$, where $\Phi(\cdot)$ represents the cumulative standard normal distribution function, as well as a linear probability model that postulates $E(y_{it}|X_{it}) = X_{it}\beta$. We model an individual's occupational or industry switch to depend on her age, age squared, a time trend, and the current level of unemployment in the county of residence.[9] Because of the change in the coding procedure in 1981, we also include a dummy variable $Break$, which assumes the value of one if the year is in the period 1981-1997. Further, we interact the time trend, the unemployment variable, and the break variable with age and age squared in order to allow different age groups to have different trends in mobility over time and over the business cycle, as well as different changes in mobility as a result of the change in the coding procedure in 1981. Finally, all of the above variables are interacted with an education dummy variable that takes the value of one if the individual has more than 12 years of education and zero otherwise. The complete list of variables is contained in Table 1.[10] The model is estimated on our full sample as opposed to being estimated separately for each age-education subgroup. Finally, since we assume that the coding error

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[9]We choose unemployment in the county of residence - rather than GDP growth - as our indicator of the macroeconomic conditions because local labor market situations directly affect worker mobility decisions. The weighted average of the county of residence unemployment rates on our sample is very similar to the economy-wide unemployment rate. The choice of the business cycle variable (or omitting it all together), however, will turn out to be of little importance for our results.

[10]We allow for the interactions between dummy variable $Break$, age, and education because one may expect the coding error to be distributed non-uniformly over age-education groups. This may be particularly true at the three-digit level, since, at this level, occupations are very disaggregated and while it is virtually impossible to misclassify a medical doctor, it is possible to misclassify a machine operator, and the distribution of doctors and machine operators is not uniform across the age-education groups. On the one- and two-digit level occupational classifications, however, one has less reason to expect the coding error to vary across the age-education groups. Similar arguments apply to industries.

present in our data results only in an affine shift in the argument of ξ, all the data (i.e., the data before and after 1980) identify the time trend.

The estimated coefficients allow us to obtain fitted values for each individual - the predicted probability of an occupation (industry) switch - in each of the years that the individual is in the sample. We predict one's mobility in each year after 1980 if there was no structural change in the coding procedure (setting the coefficient on $Break$ and all of its interactions to zero). Using these fitted values, we obtain occupational (industry) mobility - overall and in each of the age-education groups. The difference between the predicted probability of a switch in each year with and without setting the coefficient on $Break$ to zero represents the estimate of mobility due to the coding error. When plotting the aggregate occupational and industry mobility (not the fitted lines) in Figures 2, 3, and 6, we subtract the estimate of mobility due to the coding error from the raw data in each year after 1980. Our estimates imply that the use of the uncontrolled data will result in estimates of the three-digit occupational and industry mobility that is approximately 25 percentage points higher than its true level. The estimate of mobility due to the coding error goes down but is still substantial at 14 and 10 percentage points at the two- and one-digit levels, respectively.

We weigh the sample using the PSID sample weights in order to make the sample representative of the U.S. population in each period. This weighing of the sample has little effect on our results.

A useful additional experiment is to consider mobility trends had the overall age, educational, and racial structure of the population remained constant throughout the 1968-1997 period. To this end, we divide the sample into 88 age-education-race groups.[11] We then construct 1970 weights, 1980 weights, 1990 weights, as well as average weights that reflect

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[11]Specifically, by age, individuals are divided into 11 four-year age groups, starting with age 22. By education, individuals are divided into high-school dropouts, high-school graduates, some college, and college graduates. By race, individuals are divided into whites and non-whites.

the average size of each group during the period. For example, in constructing the 1980 weights, we calculate the relative size of each group in 1980. Then, in all other years, we scale everyone's weight in each group in order to keep the relative size of each group at its 1980 level. Weighing the sample using, say, the 1970 weights will then be suggestive of the behavior of occupational and industry mobility in the United States had its population not grown older and more educated on the average. In this sense, fixing the population structure may provide a better picture of the underlying changes in the forces affecting the labor markets. This experiment is, of course, based on a strong assumption that changing demographics does not affect the switching behavior of each worker.

3.2 Main Results

Figure 2 plots the estimates of mobility across occupations and industries over the 1968-1997 period obtained from a linear probability version of Equation 1. Figure 3 depicts the corresponding estimates of mobility obtained from the probit version of Equation 1. Table 1 reports the estimation results from the probit model for occupation and industry switches. Figures 4 and 5 plot the estimated trends in occupational and industry mobility by age and education groups. Finally, Figure 6 depicts the estimates of mobility across occupations and industries over the 1968-1997 period obtained from the probit version of Equation 1 for the fixed 1980 population structure.

3.2.1 The Level of Overall Mobility

As summarized in Table 2, the average level of occupational mobility is 13% at the one-digit level, 15% at the two-digit level, and 18% at the three-digit level. The corresponding numbers are 10%, 11%, and 12% for industry mobility. As illustrated below, despite being apparently high, these estimates of the level of mobility are substantially lower than the ones

obtained from the originally coded data (e.g., in Parrado and Wolff (1999)). In fact, because we use the Retrospective Files in the analysis, these numbers represent the most accurate estimates of the annual occupational mobility in the literature.[12]

The numbers above suggest that the one-, two-, and three-digit mobility levels are of a similar enough magnitude so that many of the switches at a three-digit level are also switches across the much more aggregated one- and two-digit codes (a switch at a one-digit level implies a switch at the two- and three-digit levels, but not otherwise). For example, consistent with Markey and Parks II (1989), we find that almost 70% of the three-digit occupational switches entail a one-digit occupational switch as well. It is notable that the fraction of three-digit switches that are also one- or two-digit switches has increased significantly over the period.

3.2.2 Dynamics of Overall Mobility

All of the panels in Figures 2 and 3 exhibit an increase in overall occupational and industry mobility over the period. For example, under the more conservative probit regression, occupational mobility has increased from 10% to 15% at the one-digit level, from 12% to 17% at the two-digit level, and from 16% to 20% at the three-digit level. The estimates of the time trend of overall mobility also obtained from the probit regression are presented in Table 3. The reported coefficients represent the derivative of the probit function with respect to time. For the overall sample results, the derivative is computed around the mean of all variables. All of the reported increases in mobility are statistically significant at the 1% level. The

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[12]The fact that these high levels of mobility are not due to measurement error is corroborated by the findings in Hagedorn, Kambourov, and Manovskii (2004). In that paper the authors use a large panel of male workers in West Germany over the 1975-1995 period, representing a 1% sample from German Social Security records (IAB data). This data set provides very detailed and accurate administrative labor market information on each worker. With sample restrictions and definitions of mobility equivalent to those in this paper, the authors find annual occupational mobility of 12% at the three-digit level and industry mobility of 10% at the two-digit level. Since Germany is generally perceived as a country with rigid labor markets, one would expect the levels of mobility in the United States to be higher.

trend in three-digit occupational mobility that we identify is consistent with the findings in Markey and Parks II (1989) based on the January CPS supplements collected periodically since 1966.[13] This rise in mobility may imply a substantial increase in the destruction rate of human capital.[14]

3.2.3   Patterns of Mobility for Various Age-Education Groups

Figures 4 and 5 and Tables 2 and 3 summarize the patterns of mobility across occupations and industries over the 1969-1997 period for various age-education groups.

As might be expected, levels of mobility differ significantly across the age-education groups. Both occupational and industry mobility rates decline with age.[15] This finding is consistent with the standard human capital and occupational-matching theories and is corroborated by the evidence in Miller (1984) and McCall (1990). If human capital of workers is accumulated with occupational experience, the opportunity cost of switching occupations is rising with occupational tenure.[16] Thus, as the average occupational experience in a cross-section of workers is rising with age, occupational mobility is declining with age. In addition, life-cycle considerations reduce mobility with age, since the pay-off period from investing in skills in the new occupation or learning about the match quality with the new occupation declines with age.[17]

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[13]Murphy and Topel (1987) have argued using the March CPS data that two-digit industry mobility has declined sharply over the 1970-1984 period. Their result is entirely driven by a 40% decline in mobility between 1975 and 1976. Moscarini and Vella (2003) argue that this was due to a revision in the March CPS imputation procedures in 1976. There is no evidence of this decline in either the PSID or the January CPS data.

[14]Parrado and Wolff (1999) argue that occupational and industry changes are associated with lower earnings and that this effect has lessened over time. If that is indicative of a decline in the specificity of human capital, then that may help account for the increase in occupation and industry mobility.

[15]Since levels of mobility on one- two- and three-digit level are close to each other, and since the statistical model we have estimated did not impose any restrictions on estimates at different aggregation levels, it is possible that the estimated levels of mobility do not increase monotonically with the number of digits in the occupational or industry classification. The extent of such non-monotonicity turns out to be very minor.

[16]We find the hazard rate of an individual switching occupations declining sharply with the occupational tenure of that individual.

[17]Interestingly, there is evidence of a U-shape pattern of mobility with age, especially for educated workers.

In the same age group, the college-educated workers exhibit lower occupational mobility than their less educated counterparts. This is perhaps not surprising. Since college education may be thought of as representing investment in human capital that is not perfectly transferable across all occupations, it is expected to reduce workers' occupational mobility. What is surprising, however, is the finding that occupational mobility of college-educated workers is quite high. This indicates that either college provides workers with skills that are fairly transferable (general) or that college education represents a very risky investment for workers. Both possibilities open interesting avenues for future research.

The results indicate that among those with more than 12 years of education, occupation and industry mobility increased for almost all of the age groups. Among those with 12 years of education or less, mobility increased significantly for workers younger than 40. Occupational and industry mobility did not change significantly for older, uneducated workers.

3.2.4 Dynamics of Overall Mobility with a Fixed Population Structure

The increase in overall occupational and industry mobility is even more pronounced when we reweigh the sample to hold the population structure fixed. Using occupational mobility as an example, fixing the population structure in the probit regression to be the same as in 1980, it has increased from 11% to 16% at a one-digit level, from 13% to 18% at a two-digit level, and from 17% to 23% at a three-digit level. This finding is not particular to our choice of fixing the population structure to be the same as in 1980. We obtained essentially the same results when fixing the demographic structure to be the same as the average over the period, or as in 1970, or 1980, or 1990. The estimated time trend is positive, significant at

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This pattern is more pronounced for occupations than industries. This is consistent with a model of on-the-job training that allows for human capital depreciation, as in Ben-Porath (1967). If workers find it optimal to let their specific human capital stock decline late in their working life, they become less attached to their sector of employment. While high human capital workers may be reluctant to switch out of a sector that suffers a temporary decline in demand for its services, workers whose human capital has depreciated sufficiently may be more willing to switch.

1%, and similar across all fixed population structures.

This finding suggests that the apparent slowdown in the rate of increase in mobility in the mid 1980s in Figures 2 and 3 that are based on the actual population structure may be entirely due to the composition bias. The share of high mobility age-education subgroups of the population is declining over time, and this effect partially offsets the increase in mobility within most groups.

4 Sensitivity Analysis and Related Discussion

4.1 Occupational and Industry Mobility as Revealed by the Originally Coded Data

One check of the robustness of our finding of a significant increase in occupational and industry mobility in the United states over the 1968-1997 period is to describe the level and the trend of occupational and industry mobility as revealed by the originally coded data.

Overall occupational and industry mobility, obtained from the originally coded data, is presented in Figure 7. The fitted occupational (industry) mobility for each year is obtained following the same empirical methodology as in Section 3 but excluding the variable *Break* and its interactions from the model, since there is no longer a break in the coding procedure in 1981. All of the panels in Figure 7 show a sharp increase in overall mobility. Occupational mobility increases from 20% in 1969 to 28% in 1997 at the one-digit level, and from 25% in 1977 to 32% in 1997 at the two-digit level. Industry mobility increases from 14% in 1975 to 24% in 1997 at the one-digit level, and from 22% in 1977 to 30% in 1997 at the two-digit level. The results in Parrado and Wolff (1999) who use originally coded data to study mobility at the one-digit level imply a similar increase in mobility.[18]

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[18]We do not plot industry mobility in the years 1972-1974, nor do we use it in the regression. We do so because industry mobility obtained from the originally coded data in those years is substantially higher than in any other year. The Retrospective Files do not exhibit such a pattern. It appears that there is something wrong with the original PSID coding of industry affiliation in those years. Loungani and Rogerson (1989)

Figure 8, which reports the fitted occupational and industry mobility by age-education groups, further validates our finding that the increase in occupational and industry mobility was pervasive. As we saw using the Retrospective Files, it also increased for most of the age-education subgroups of the population when we use only the originally coded data.[19]

Of course, since we are using the originally coded data in this subsection, the level of mobility is exaggerated by the presence of the measurement error in occupation and industry coding. For example, it implies that the average worker switches her aggregated two-digit occupation once every three years. The use of the Retrospective Files in the previous section revealed a much lower corrected level of mobility.

We will also use the Retrospective Files below to show that the trend in mobility identified in the originally coded data is informative. This is not clear ex ante because an increase in mobility on the originally coded data may have been driven by the increasing amount of the coding error over time. A simple reason may be that the PSID codes occupations and industries using the same 1970 classification that becomes more and more outdated over time. Or maybe the reallocation of workers from manufacturing to services resulted in a higher fraction of workers employed in sectors that are characterized by higher amount of coding error later in the period. We will show below that these hypotheses are not correct.

4.2 Sensitivity to the Model Specification

4.2.1 The Effects of the Coding Error

Our motivation for modeling the effect of the coding error as an affine shift came from Figure 1. Recall that from 1968 till 1980, at the one digit level, we have information about one's occupation both in the Original and the Retrospective Files. First, using the Retrospective

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also report this problem.

[19]For an unclear to us reason, however, the originally coded data implies a relatively larger increase in mobility of older educated workers than what is implied by our analysis that used the Retrospective Files.

Files we computed one-digit occupational mobility and then fitted a linear probability version of model 1 - the results are plotted as the two lower lines on Figure 1. Second, we computed one-digit occupational mobility on the originally coded data and fitted a linear probability version of model 1 to it - the results are plotted as the two upper lines on Figure 1. Comparing the results from the Original and the Retrospective Files, we see that while mobility is higher on the originally coded data, the trend appears to be quite similar suggesting that the nature of the coding error is indeed such that it leads to an affine shift in mobility.

More formally, we test whether the derivative with respect to time in both regressions (one on the originally coded data, the other on the Retrospective Files) is the same. We cannot reject the hypothesis that it is the same at any conventional significance level (p-value of 0.7618) confirming that the coding error leads to only an affine shift in mobility.

Finally, we further test whether the coding error causes only an affine shift by estimating a linear probability model that includes, along with all the right hand side variables in Equation 1, the following variables:[20] $\beta_{24}Time*Break$, $\beta_{25}Time*Educ*Break$, $\beta_{26}Unemp*Break$, $\beta_{27}Unemp*Educ*Break$, $\beta_{28}Time*Age*Break$, $\beta_{29}Time*Age*Educ*Break$, $\beta_{30}Time*Age^2*Break$, $\beta_{31}Time*Age^2*Educ*Break$, $\beta_{32}Unemp*Age*Break$, $\beta_{33}Unemp*Age^2*Break$, $\beta_{34}Unemp*Age*Educ*Break$, $\beta_{35}Unemp*Age^2*Educ*Break$. Estimating the model that includes these terms, we find that they are highly statistically insignificant both individually and jointly. At the same time, the remaining interactions of the $Break$ variable that are included in our baseline regression are mostly statistically significant individually and are highly significant jointly. This is again consistent with Figure 1 which suggests that the coding error causes an affine shift with a minor effect on the time trend.

The specification that we have adopted for the linear probability model is consistent with

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[20]This specification is consistent with the linear version of the following simple model of the coding error. Suppose that there is a probability p that a worker is erroneously misclassified as having switched sectors in date t in the originally coded data. This implies $\Pr(i$ recorded as having switched $) = [1 - \xi(\beta X)]p + \xi(\beta X)$.

the coding error resulting in an affine shift only. A complication arises in the case when ξ is not linear, for example, in the case of a probit regression. Given our way of adjusting the figures that are based on the probit regression, our analysis is conservative in the sense that it provides a lower bound on the increase in mobility. This is due to the convexity of the left tail of the cumulative standard normal distribution and the facts that the estimates of the trend we obtain are positive and that the probability of a switch does not exceed 50%. In other words, since βX is increasing linearly with time, the effect of the affine shifter *Break* increases more than linearly with time. Thus, in the probit regression we obtain an increasing coding error despite the affine shift inside the probit function. Thus, the way of adjusting Figures 3 to 6, 9, and 10 that we adopt represents the lower bound on the mobility increase over the 1981-1997 period.

Alternatively, we could obtain an estimate of the coding error in, say, 1981, or compute an average coding error in the 1981-1997 period and subtract this one value from each observation after 1980. Under such a procedure, the overall mobility increases would, on average, be one percentage point larger than the ones in Figures 3 to 6, 9, and 10. We do not include these figures into the paper since under such a procedure the estimated increase in mobility from the probit model is virtually the same as the one obtained from the linear probability model presented in Figure 2 (which also suggest approximately one percentage point larger increases in mobility).[21]

4.2.2 Parametric Assumptions

The fact that the model is estimated on our full sample, as opposed to being estimated separately for each age-education subgroup, does not drive our results. In Kambourov and Manovskii (2004d) - a working paper version of this article - we characterized worker mo-

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[21] A difficult but potentially useful alternative approach is to write down a model of the coding error, and estimate its effects by maximum likelihood.

bility without imposing any structure on the relationship of mobility across age-education groups and obtained very similar results. We have also experimented with imposing a cubic polynomial structure in age and a quadratic in time with no noticeable change in the results.

4.3 Sensitivity of the Empirical Results to the Sample Restrictions

In this subsection we provide evidence that our results are robust to numerous variations in the sample selection criteria. Our usual sample, called the base sample here, is restricted to male heads of household, aged 23-61, who are not self- or dual-employed and are not working for the government. In Figure 9 we show how the measure of occupational mobility at the two-digit level[22] is affected if we relax some of the imposed sample restrictions. The addition of women to the base sample makes the increase in mobility slightly bigger, while the addition of self-employed workers shifts up the mobility graph without affecting its slope. Adding government workers to the base sample makes the increase in mobility 2 percentage points lower than what it would otherwise have been (more on this below). Adding workers who are 18 to 22 years old raises the level of occupational mobility in all years, although the overall increase in mobility over the period is 1 percentage point lower than in the base sample. Restricting the base sample to full-time workers only (those who report working at least 1,500 hours in a given year) results in an increase in mobility that is 0.5 percentage points lower than in the base sample. Finally, simultaneously incorporating all of the above restrictions leads to a smaller increase in occupational mobility.

4.4 Occupational Mobility and Unemployed Workers

One advantage of using the PSID data to study occupational and industry mobility is that the PSID, being a panel data set, allows us to follow individuals through unemployment

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[22]Our choice to present the results at the two-digit level is inconsequential for the message of this subsection.

spells. If a worker is employed at the interview date in year t, unemployed in year $t+1$, and employed again in year $t+2$ in a different occupation, the PSID allows us to capture this occupational switch. If one uses the (March) CPS, for instance, this occupational switch will not be captured, since in year $t+2$, the CPS provides information only on the worker's current occupation and last year's occupation but not on the occupation in period t. To compute occupational (industry) mobility in the CPS, one needs to restrict the sample to workers who are employed in two consecutive years and consider what fraction of this sample changed occupations (industries).[23]

Figure 10a compares our preferred measure of occupational mobility at the two digit level with the one obtained on the sample of workers employed in two consecutive years. Two conclusions emerge. First, not taking the unemployed individuals into account reduces the measured level of occupational mobility by around 2.5 percentage points. Second, the trend in occupational mobility is slightly different: the second measure exhibits a smaller increase in mobility in the 1980s. This evidence suggests that workers in the 1980s might have been facing more fundamental occupational changes requiring a higher degree of skill upgrading and retooling and longer periods of transition from one occupation to another. This is consistent with the evidence in Murphy and Topel (1987), who report that the rise in unemployment in the 1970s and early 1980s was almost entirely due to the rise in the incidence of long spells of unemployment.

Note that since the PSID sample starts in 1968, in 1969 we compute mobility on the sample of those who were employed in 1968 and 1969. According to the discussion above, this may bias downward our mobility measure in 1969. Fortunately, 1968 was a very low unemployment year - only 4.2% of the workers in our sample were unemployed in 1968. Furthermore, by 1969 91% of them were already re-employed. That implies that the mobility

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[23]A similar definition was used in Parrado and Wolff (1999) who used the PSID data.

from 1970 on is accurately computed.

4.5   Occupational Mobility of Government Workers

The pattern of occupational mobility exhibited by government workers is markedly different from the observed general pattern. We define occupational mobility for government workers in year t as the fraction of government workers who in year t work in an occupation that is different from the one they worked in in year $t-1$ or the last time they were employed. Most of the occupational switches thus identified represent workers changing occupations within the government rather than workers entering the government sector and starting in a new occupation.

Figure 10b shows two-digit occupational mobility for government workers for the period 1969-1997. Two observations are noteworthy. First, occupational mobility for government workers is two times lower - around 8% - than the mobility of workers in the private sector. Second, occupational mobility of government workers has declined sharply over the period - from 10% in the late 1960s to 6% in the early 1990s. These facts explain why including government workers in the sample decreases the overall level and flattens the upward trend in occupational mobility.

The trend in occupational and industry mobility of government workers is in such contrast to that of private-sector workers that it begs for a rigorous investigation of its sources. One possible explanation for this observation may be the change in the occupational mix employed by the government, due to, for example, contracting out of many government-provided services.

4.6 Occupational Mobility and the Reallocation of the Labor Force from Manufacturing into Services

During the 1968-1997 period there was a substantial change in the employment shares of various broad sectors of the economy. For instance, while the share of manufacturing declined, the share of the service sector increased. In this subsection we evaluate two hypotheses. First, we ask whether the increase in mobility could be explained by workers moving into sectors that are characterized by higher amount of coding error. Second, we ask if the increase in mobility was caused by a changing sectoral composition of the economy in favor of sectors with genuinely higher worker mobility. The answer to both questions is no.

We divide our sample into growing and declining 1-digit sectors. Agriculture, mining, construction, and manufacturing are all sectors whose employment share declined over the period. The sectors which experienced an increase in their employment share are transportation and communications, wholesale and retail trade, personal services, and finance and insurance. During the 1977-1980 period we have both the true two-digit occupational switches from the Retrospective Files and the noisy switches from the originally coded data.

To address the first question we compute the fraction of workers in each sector who did not switch their occupations in the reliable retrospective data, but would be wrongly classified as switchers in the originally coded data. We find that the coding error is higher in the declining sectors. For instance, 19% of the nonswitchers are wrongly classified as switchers in manufacturing, 21% in mining, and 21% in construction. That fraction is only 12% in wholesale and retail trade, 15% in the finance and insurance sector, and 13% in the personal services sector. This implies that the sectorial composition of the economy has changed in favor of sectors with lower amount of coding error. Thus, the documented increase in mobility represents a lower bound on the true increase.

To answer the second question, we compute occupational mobility within each broad sector using the reliable data from the Retrospective Files for the 1969-1980 period. We find that true occupational mobility within the growing sectors was lower than within the declining ones. For example, occupational mobility at the two-digit level is around 10% in manufacturing, 9% in construction, and 10% in mining. Within the service sectors, however, it is lower: around 7% in transportation and communications, 9% in wholesale and retail trade, 7% in the finance and insurance sector, and 5% in the personal services sector. This implies that changes in the sectoral composition tended to offset the increase in mobility that we found.

4.7 Is Fixing the Occupational and Industry Classification over the Period Appropriate?

As mentioned above, the PSID uses the same 1970 Census of Population occupation and industry codes throughout the 1968-1997 period. Clearly, some of the occupations people worked in in the early 1990s were not even in existence when the 1970 Census classification was developed. How does this affect the levels and trends in mobility that we document in this paper? When new occupations appear, workers in those occupations will be coded as belonging to the "not elsewhere classified" occupational categories of the outdated classification. This implies that, over time, these "not elsewhere classified" occupations themselves represent collections of new occupations. Since we cannot identify switches across those occupations, over time we necessarily identify a smaller and smaller fraction of occupational switches.[24] This implies that the increase in occupational and industry mobility documented in this paper represents a lower bound on the true increase. This downward bias is likely especially strong on the three-digit level.

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[24]The fraction of workers in our sample employed in the "not elsewhere classified" occupational categories increases from 14% to 21% over the 1968-1997 period.

It does not appear feasible to identify by how much we underestimate mobility late in the sample owing to the use of the 1970 classification. One may consider using the March CPS, which changed its occupational and industry classifications three times during the 1968-1997 period. Unfortunately, each successive occupational classification not only introduces new occupations but also aggregates some of the existing ones. As a consequence, in the March CPS data, occupational mobility *declines* each time a new classification is introduced. This makes the interpretation of trends in occupational mobility obtained from the March CPS difficult.

5 Additional Facts on Worker Mobility

5.1 Net Occupational Mobility

So far we have studied the gross reallocation of workers across occupations and industries. In this section we study the behavior of the net reallocation, defined as one-half of the sum of the absolute changes in occupational employment shares, i.e., if $s_{m,t}$ is the fraction of employment in occupation m in year t, net mobility in year t is given by $1/2 \sum_m |s_{m,t} - s_{m,t-1}|$.

The analysis in this section provides insights into the reasons for the observed high levels of gross mobility. In particular, if mobility is primarily caused by shifting demands for labor in different sectors of the economy (as in Lucas and Prescott (1974)), gross flows of workers should approximately equal net flows. If, however, it turns out that gross flows dwarf net flows, this would point the quest for understanding workers' mobility decisions toward studying the matching process between workers and occupations (as in Jovanovic (1979), Miller (1984), and McCall (1990)).[25]

As pointed out earlier in the paper, until 1980 the Retrospective Files provide us with

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[25]Jovanovic and Moffitt (1990) study the relative importance of sectoral shocks and employer-worker mismatch in explaining sectoral reallocation. They, however, use only three very aggregated sectors: manufacturing, services and trade, and other industries.

reliable information on sectoral affiliations in the economy, while after 1980 we are restricted to using the noisy originally coded data. When studying gross occupational mobility, it is imperative to control for the coding error after 1980. In the case of net mobility, however, the issue is more subtle. If one individual could be wrongly misclassified from occupation x into occupation y, then it is conceivable that another worker might be misclassified from occupation y into occupation x. Such switches cancel out, leaving no effect on computed net mobility.[26] To estimate the contribution of the coding error to net mobility, we regressed net occupational mobility on a constant, time trend, unemployment, and a dummy variable $Break$, which takes the value of one for all years after 1980. Then, in reporting net occupational mobility in Figure 11, we subtract the estimated coding error as given by the coefficient on the $Break$ variable. Consistent with the discussion above, at the one- and two-digit levels, the estimated coding error is very small and statistically insignificant, and controlling for it turns out to be almost inconsequential for the reported results. We find that at the one-digit level, net mobility increases from 1% to over 3% over the 1970-1997 period, while at the two-digit level the increase is from 3% to 6%. At the three-digit level, the estimate of the coding error is larger and statistically significant. In particular, net occupational mobility increases from 9% to 15% if one does not account for the coding error post 1980, and from 9% to 13%, if one does.

We conclude that net occupational mobility is high and that the increase in gross mobility over the 1968-1997 period is accompanied by an increase in net mobility.[27] This lends support

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[26]Blanchard and Diamond (1990) present a somewhat more formal exposition of this argument.

[27]As opposed to the level of gross mobility, the levels of net mobility found in the PSID should be interpreted with caution because of the relatively small PSID sample size. We tried enlarging the sample by pooling together observations for several years or including females in the sample, and the results were virtually unchanged. Because of the relatively small sample size an increase in gross mobility (even if the origins and destinations of all individual moves are purely random) may result in a spurious increase in net mobility. We used Monte Carlo simulations and found that net mobility could have increased by around 1 percentage point at most due to such bias.

to the hypothesis that the rise in gross occupational mobility is attributable to the increased variability of occupational labor demands.

5.2 The Extent of Return Mobility

An important question that restricts the theories of worker mobility is how permanent occupational and industry switches are. To address this issue, we compute the fraction of workers who switch their occupations (industries) and then return to the original occupations (industries) one, two, and three years after the switch. The Retrospective Files are appropriate for computing this statistic. For each of the years from 1969 till 1977, we identify those workers who have just switched their occupation (industry), and then we follow them for three years in order to determine the fraction that returns to their original occupation (industry). The reported statistics are averaged over the period.

The results summarized in Table 4 indicate that around 30% of workers return to their one-digit occupation (industry) within a three-year period, and around 20% return to their three-digit occupation (industry). These estimates are in line with those reported by Loungani and Rogerson (1989) for two-digit industry switches. The probability of return declines sharply with years after the switch.

5.3 Occupational Mobility across Broad Occupational Groups

Why is mobility of college-educated workers so high and increasing? A conjecture often offered is that this might be due to upward career mobility into management positions. Therefore, we take a more detailed look at the nature of the observed occupational switches. We show that while some of the increase in mobility in the high-skilled occupations indeed came from moves into management positions, an equal fraction involved moves into occupations typically employing lower-skilled workers.

We study the patterns of occupational switches over time across six large occupational groups that correspond to the one-digit occupational classification: group 1 - professional, technical, and kindred workers; group 2 - managers, officials, and proprietors; group 3 - clerical and sales workers; group 4 - craftsmen, foremen, and kindred workers; group 5 - operatives and kindred workers; and group 6 - laborers and service workers. Unfortunately, we cannot use a finer occupational partition because the sample size would be too small to precisely estimate all the implied occupational transitions. For comparability across time, we use originally coded data for this analysis. Thus, while the implied level of mobility is too high, the trends are informative.[28]

We concentrate the analysis on three time periods: 1969-1975, 1979-1985, and 1989-1995. The procedure is as follows. We count those employed in a given year in occupation i who will be working the following year in occupation j and divide this by the number of those who are employed today in occupation i and who will report any occupation next year (by doing so we effectively restrict the sample to those employed and reporting occupations in both years). This is done in each year in the specified time period, and the average result weighted by the PSID sample weights is reported in the cell ij of Table 5.[29]

The results confirm our findings of increased overall occupational mobility. Except for group 5, where the fraction of stayers remains quite similar over time, all other occupational groups exhibit a significant decrease in the fraction of workers who remain in those occupations from one year to the next. Consistent with our earlier findings, the increase in mobility is not limited to occupations that employ mainly highly educated (groups 1 and 2) or mainly

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[28]We repeated the same analysis using the Retrospective Files in the 1970s. We do not report those findings because it is not clear what is the most appropriate procedure for identifying genuine *individual* occupational switches in the noisy originally coded data after 1980. An extensive discussion of such procedures can be found in Kambourov and Manovskii (2002). We experimented with a number of such procedures, and all the experiments supported the basic message of this subsection: the increase in occupational mobility was not driven by an increased flow of workers into or out of a particular one-digit occupation.

[29]The results obtained on the unweighted sample are similar.

uneducated workers (groups 3, 4, and 6).

The mobility of those who move out of educated groups like 1 and 2 is particularly interesting. The data indicate that although some of the increase in mobility from educated groups comes from occupation switches between groups 1 and 2, a higher fraction of workers in those occupational categories are moving into less educated occupational groups. In fact, while in the 1969-1975 period, on average 4.34% of workers in group 1 switched to groups 3 to 6 from one year to the next, in the 1989-1995 period 8.67% did. The corresponding numbers for group 2 workers are 11.25% and 16.58%.

Note that the results of this subsection are not driven by business cycle effects. All three periods represent roughly the same business cycle characteristics. We have performed similar analysis for selected years only, and the results are essentially the same. The analysis suggests that the increase in occupational mobility was not limited to a subset of particular one-digit occupations. In this sense the increase in occupational mobility was pervasive.

The analysis in this subsection also sheds light on the hypothesis in Jovanovic and Nyarko (1997) that many occupations serve as stepping-stones or springboards for other occupations and this accounts for a substantial fraction of occupational mobility. As noted in McCall (1990), under this hypothesis our Table 5 should be very asymmetric across the diagonal. The fact that this is not the case implies that we cannot order one-digit occupations to form a sequence in a typical career path. Perhaps one must look at more disaggregated occupations for evidence of stepping-stone mobility.

5.4 Mobility across Occupation-Industry Cells

In this subsection we briefly characterize the mobility across occupation-industry cells. It is defined as the fraction of currently employed individuals who report a current occupation-industry pair both elements of which are different from their most recent previous report of

an occupation-industry pair. Mobility across occupation-industry cells was used as a measure of career mobility in Neal (1999). Since there may be instances where skills are transferable both across industries within an occupation and across occupations within an industry, Neal decided to identify only changes in both occupation and industry as transitions that involve a loss in human capital. In addition, such definition of mobility may be useful for researchers who work with data sets other than the PSID and face the problem of measurement error in the occupation and industry coding. In Kambourov and Manovskii (2004d) - a working paper version of this article - we show that switching both an occupation and an industry is more likely to identify true switches rather than erroneous miscoding.

As figures 12 and 13 illustrate, mobility across occupation-industry cells is naturally lower than either occupational or industry mobility. It has increased significantly over time.

5.5   Occupational Mobility over the Business Cycle

A detailed analysis of the behavior of occupational (industry) mobility over the business cycle is called for but is beyond the scope of this paper. Here we just point out some basic but important observations. We find that net occupational (industry) mobility is countercyclical, while gross mobility is mildly procyclical. As is evident from Figure 14, however, this masks the different patterns of behavior of various age-education subgroups over the business cycle. Figure 14 shows the effect of a marginal increase in the unemployment rate on occupational mobility at the three digit level. Two things stand out. First, for both education groups, occupational mobility is countercyclical for the young and old workers and procyclical for the middle-aged workers. Second, while occupational mobility of workers with education levels of high school or less is strongly affected by the business cycle conditions, the mobility of college-educated workers is much less influenced by the business cycle. These findings suggest a potentially important type of worker heterogeneity so far overlooked in the analysis of the

welfare costs of business cycles.

6   Conclusion

The analysis in this paper was designed to provide a set of key facts characterizing the patterns of occupational and industry mobility in the U.S. over the 1968-1997 period. We document that the level of occupational and industry mobility is high and has increased substantially over the period. In addition, we show that this constitutes a profound change in the labor market that has affected a large fraction of the labor force. For instance, occupational mobility has increased for most age-education groups, and its rise was not driven by an increased flow of workers into or out of a particular one-digit occupation.

A key contribution of the analysis was the use of the Retrospective Files. This paper was the first to identify the Retrospective Files as the best data on annual occupational and industry mobility available in the United States. This insight allowed us to obtain the most reliable estimates of the levels of mobility - estimates that are considerably lower than those found in the rest of the literature. In addition, it gave us confidence in interpreting the trends in mobility. It turned out that the trends in mobility are very similar in the originally coded data and in the Retrospective Files. Since these data were coded at different time and using different methodologies, one can no longer argue that the trend in mobility was attributable to a trend in the coding error.

We defined occupations and industries using the one, two-, and three-digit classifications used by the 1970 Census of Population and provided by the Panel Study of Income Dynamics for the 1968-1997 period. The examination of the occupational titles suggests that human capital is likely to be three-digit rather than one- or two-digit specific. A close look at the three-digit occupation classification reveals that skills accumulated in a given three-digit

occupation may not be easily transferable to another three-digit occupation. For example, if an economics professor becomes a psychologist or a librarian, then, despite staying in the same one- and two-digit occupation, she would not be able to use most of the human capital she accumulated while in economics. Results in Kambourov and Manovskii (2002) confirm this intuition. Specifically, they find that the returns to 5 years of occupational experience are as high as at least 8% at the one-digit level, 10% at the two-digit level, and 12% at the three-digit level. Thus, we suggest that researchers interested in calibrating models of worker mobility associated with human capital changes should use the levels and trends in occupational mobility at the three-digit level.

Even the 3-digit occupational classification, however, may not perfectly represent the specific human capital. First, a finer partition may be required for some 3-digit occupations such as, for example, computer programmers (003) or medical and osteopathic physicians (065). Second, there may exist subsets of the 3-digit occupational classification such that no human capital is destroyed when switching occupations within such a subset. Possible examples are a salesman (260) who becomes sales manager (231/233), or an assembler (602) who becomes a foreman (441), or bookkeeper (305, 341) who becomes an accountant (001), or a health service worker (921-926) who becomes a health technician (080-085). While the data availability does not permit one to address the first concern, it appears interesting but difficult to construct a metric of how transferable occupational experience is between two given occupations. It remains true, however, that everything else being constant, the average worker with 5 years of occupational tenure would see his wages decline by at least 12% upon an occupation switch because many of the skills accumulated in the previous occupation are not used any longer and new skills need to be developed.

In view of this sharp rise in mobility, the next logical step is the investigation of the

causes of its increase. Kambourov and Manovskii (2004c) suggest that the variability of occupational demand shocks has increased over time. They also argue in a general equilibrium model that the increase in mobility was not likely to be caused by a decline in the costs of switching occupations. Other potential causes of the increased mobility include technological change, globalization and international trade, changes in government regulation and labor force unionization. An intriguing research question is to relate changes in occupational mobility to changes in the growth rate of productivity. It may not be a coincidence that the increase in occupational mobility has coincided with the much discussed slowdown in productivity growth.

We think that this paper raises an important set of research questions. Why do people switch their occupations so often? How do people choose their occupations? Why has occupational mobility increased so much in the last 30 years? Is the increase in occupational mobility important for understanding the changes in wage inequality and the aggregate performance of the economy? We believe that answering these and other related questions will significantly advance our understanding of labor markets.

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Table 1: Estimation Results.

Variable	Occupation			Industry		
	1-Digit (1)	2-Digit (2)	3-Digit (3)	1-Digit (4)	2-Digit (5)	3-Digit (6)
Age	-0.0135	-0.0194	-0.0311	-0.0183	-0.0304	-0.0328
	(0.0115)	(0.0122)	(0.0140)	(0.0103)	(0.0112)	(0.0132)
Agesq	-0.0006	-0.0001	0.0004	0.0002	0.0010	0.0009
	(0.0009)	(0.0009)	(0.0010)	(0.0008)	(0.0009)	(0.0010)
Time	0.0034	0.0038	0.0062	0.0052	0.0058	0.0051
	(0.0021)	(0.0022)	(0.0026)	(0.0018)	(0.0021)	(0.0024)
Break	0.0094	0.0221	0.0699	-0.0048	0.0108	0.0819
	(0.0329)	(0.0352)	(0.0407)	(0.0292)	(0.0330)	(0.0362)
U	0.0094	0.0110	0.0126	0.0060	0.0084	0.0104
	(0.0035)	(0.0037)	(0.0043)	(0.0029)	(0.0034)	(0.0040)
Time*Age	-0.0004	-0.0001	-0.0007	-0.0010	-0.0009	-0.0012
	(0.0008)	(0.0008)	(0.0010)	(0.0007)	(0.0008)	(0.0009)
Time*Agesq*100	0.0023	-0.0022	0.0009	0.0061	0.0034	0.0065
	(0.0058)	(0.0058)	(0.0071)	(0.0051)	(0.0058)	(0.0065)
U*Age	-0.0052	-0.0057	-0.0060	-0.0024	-0.0030	-0.0035
	(0.0013)	(0.0014)	(0.0016)	(0.0012)	(0.0013)	(0.0015)
U*Agesq	0.0004	0.0004	0.0004	0.0002	0.0002	0.0002
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Break*Age	0.0292	0.0232	0.0363	0.0277	0.0360	0.0505
	(0.0129)	(0.0138)	(0.0159)	(0.0114)	(0.0129)	(0.0147)
Break*Agesq	-0.0013	-0.0006	-0.0010	-0.0012	-0.0012	-0.0021
	(0.0010)	(0.0010)	(0.0012)	(0.0009)	(0.0010)	(0.0011)

Table 1: Estimation Results (continued).

Variable	Occupation			Industry		
	1-Digit (1)	2-Digit (2)	3-Digit (3)	1-Digit (4)	2-Digit (5)	3-Digit (6)
Educ	0.0419	0.0909	-0.0346	0.0339	0.0097	0.0247
	(0.0544)	(0.0584)	(0.0657)	(0.0481)	(0.0540)	(0.0619)
Educ*Age	-0.0505	-0.0574	-0.0241	-0.0214	-0.0164	-0.0307
	(0.0201)	(0.0214)	(0.0245)	(0.0182)	(0.0205)	(0.0232)
Educ*Agesq	0.0036	0.0037	0.0020	0.0008	0.0008	0.0019
	(0.0015)	(0.0016)	(0.0019)	(0.0014)	(0.0016)	(0.0018)
Educ*Time	0.0003	-0.0004	0.0026	-0.0017	-0.0011	-0.0010
	(0.0034)	(0.0037)	(0.0043)	(0.0030)	(0.0034)	(0.0039)
Educ*Break	-0.0550	-0.0701	-0.0937	0.0130	0.0216	0.0131
	(0.0519)	(0.0552)	(0.0658)	(0.0503)	(0.0577)	(0.0649)
Educ*U	-0.0071	-0.0107	-0.0001	-0.0013	-0.0028	-0.0050
	(0.0062)	(0.0066)	(0.0077)	(0.0053)	(0.0062)	(0.0070)
Educ*Time*Age	0.0002	-0.0004	-0.0015	0.0009	0.0003	0.0008
	(0.0013)	(0.0013)	(0.0015)	(0.0011)	(0.0012)	(0.0014)
Educ*Time*Agesq*100	0.0011	0.0078	0.0125	-0.0037	0.0001	-0.0044
	(0.0095)	(0.0101)	(0.0112)	(0.0085)	(0.0093)	(0.0106)
Educ*U*Age	0.0041	0.0048	0.0015	0.0004	0.0014	0.0025
	(0.0023)	(0.0025)	(0.0028)	(0.0021)	(0.0023)	(0.0026)
Educ*U*Agesq	-0.0003	-0.0003	-0.0001	0.0001	-0.0001	-0.0002
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Educ*Break*Age	0.0269	0.0472	0.0659	0.0036	0.0017	-0.0024
	(0.0215)	(0.0229)	(0.0265)	(0.0193)	(0.0217)	(0.0245)
Educ*Break*Agesq	-0.0020	-0.0038	-0.0047	-0.0006	-0.0003	-0.0001
	(0.0016)	(0.0017)	(0.0020)	(0.0015)	(0.0016)	(0.0018)
N of Obs.	42864	42864	42864	42747	42747	42747

Note.- The results are from a probit regression in which the dependent variable is whether there was a corresponding switch or not. In the case of continuous variables, the reported coefficients show the change in the probability of a switch as a result of a marginal increase in the variable around its mean. In the case of dummy variables, the reported coefficients tell us the change in the probability of a switch when the dummy variable changes from 0 to 1. Standard errors are in parentheses.

Table 2: Average Estimated Switch Probability: Overall and by Age-Education Groups.

	Occupation			Industry		
Age	1-Digit (1)	2-Digit (2)	3-Digit (3)	1-Digit (4)	2-Digit (5)	3-Digit (6)

A. Overall

Age	1-Digit (1)	2-Digit (2)	3-Digit (3)	1-Digit (4)	2-Digit (5)	3-Digit (6)
23-61	0.1300	0.1490	0.1848	0.0973	0.1109	0.1182
	(0.0003)	(0.0004)	(0.0005)	(0.0003)	(0.0004)	(0.0004)

B. Some College and College

Age	1-Digit (1)	2-Digit (2)	3-Digit (3)	1-Digit (4)	2-Digit (5)	3-Digit (6)
23-28	0.2301	0.2665	0.3355	0.1920	0.2133	0.2294
	(0.0008)	(0.0009)	(0.0013)	(0.0008)	(0.0008)	(0.0008)
29-34	0.1376	0.1547	0.1932	0.1176	0.1299	0.1419
	(0.0004)	(0.0004)	(0.0005)	(0.0004)	(0.0004)	(0.0004)
35-40	0.0888	0.0963	0.1118	0.0752	0.0802	0.0892
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
41-46	0.0690	0.0733	0.0764	0.0545	0.0546	0.0617
	(0.0003)	(0.0003)	(0.0001)	(0.0003)	(0.0002)	(0.0002)
47-61	0.0725	0.0797	0.0759	0.0424	0.0400	0.0468
	(0.0004)	(0.0005)	(0.0003)	(0.0003)	(0.0002)	(0.0001)

C. High School and Less

Age	1-Digit (1)	2-Digit (2)	3-Digit (3)	1-Digit (4)	2-Digit (5)	3-Digit (6)
23-28	0.2654	0.3040	0.3909	0.2073	0.2501	0.2601
	(0.0005)	(0.0006)	(0.0008)	(0.0006)	(0.0007)	(0.0006)
29-34	0.1782	0.2113	0.2707	0.1276	0.1538	0.1592
	(0.0003)	(0.0004)	(0.0005)	(0.0003)	(0.0004)	(0.0003)
35-40	0.1215	0.1463	0.1846	0.0803	0.0952	0.0988
	(0.0003)	(0.0004)	(0.0004)	(0.0002)	(0.0002)	(0.0002)
41-46	0.0880	0.1043	0.1307	0.0551	0.0636	0.0679
	(0.0002)	(0.0003)	(0.0003)	(0.0001)	(0.0001)	(0.0001)
47-61	0.0672	0.0746	0.0947	0.0431	0.0480	0.0514
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)

Note.- Each cell represents the average, over the 1969-1997 period, predicted probability of a switch for the overall sample and for a given age-education group. Standard errors are in parentheses.

Table 3: Time Trend in Mobility: Overall and by Age-Education Groups.

	Occupation			Industry		
Age	1-Digit (1)	2-Digit (2)	3-Digit (3)	1-Digit (4)	2-Digit (5)	3-Digit (6)
A. Overall						
23-61	.0026***	.0026***	.0023***	.0030***	.0026***	.0017***
B. Some College and College						
23-28	.0040**	.0033*	.0062***	.0047***	.0049***	.0041**
29-34	.0034***	.0026**	.0029**	.0041***	.0037***	.0034***
35-40	.0032***	.0025**	.0008	.0039***	.0030***	.0028**
41-46	.0033***	.0029**	-.0001	.0037***	.0026**	.0024*
47-61	.0039***	.0041***	.0007	.0035***	.0024**	.0021
C. High School and Less						
23-28	.0036**	.0045***	.0058***	.0052***	.0058***	.0041**
29-34	.0025***	.0037***	.0043***	.0030***	.0037***	.0019*
35-40	.0017*	.0027***	.0028**	.0016*	.0021**	.0004
41-46	.0012	.0017*	.0015	.0010	.0010	-.0003
47-61	.0010	.0004	.0000	.0013	.0004	-.0003

Note.- The results are from a probit regression in which the dependent variable is whether there was a corresponding switch or not. The reported coefficients represent the derivative of the probit function with respect to time. For the overall sample results, the derivative is computed around the mean of all variables. For the various age-education groups, the derivative is computed around the variables' means for that particular group. *** - statistically significant at 1%, ** - statistically significant at 5%, * - statistically significant at 10%.

Table 4: Fraction of Workers Returning to Their Occupation or Industry, 1969-1980.

Variable	Fraction of Workers Returning After		
	One Year	Two Years	Three Years
1-Digit Occupation	0.1948	0.1063	0.0630
	(0.0100)	(0.0078)	(0.0062)
2-Digit Occupation	0.1673	0.0862	0.0521
	(0.0095)	(0.0071)	(0.0057)
3-Digit Occupation	0.1180	0.0562	0.0354
	(0.0082)	(0.0058)	(0.0046)
1-Digit Industry	0.1846	0.0614	0.0606
	(0.0098)	(0.0058)	(0.0061)
2-Digit Industry	0.1453	0.0465	0.0507
	(0.0089)	(0.0052)	(0.0055)
3-Digit Industry	0.1194	0.0350	0.0477
	(0.0081)	(0.0047)	(0.0053)

Note. - Each cell represents the fractions of workers who return to their occupation (industry) one year, two years, or three years after they have switched them. Standard errors are in parentheses. The results are obtained using the Retrospective Files for the period 1969-1980. For each of the years from 1970 till 1977 we identify those workers who have just switched their occupation (industry), and then we follow them for three years in order to determine the fraction that returns to their previous occupation (industry). The reported statistics are averaged over this period.

Table 5: Mobility Across Broad Occupational Groups.

A. Average Mobility Over the 1969-1975 Period

From	To 1	2	3	4	5	6	Relative Size
1	.9144	.0423	.0203	.0138	.0052	.0041	.1747
	(.0076)	(.0055)	(.0038)	(.0032)	(.0020)	(.0017)	(.0038)
2	.0408	.8467	.0560	.0341	.0179	.0045	.1332
	(.0063)	(.0115)	(.0073)	(.0058)	(.0042)	(.0021)	(.0034)
3	.0388	.0966	.7973	.0303	.0405	.0149	.1086
	(.0061)	(.0094)	(.0128)	(.0054)	(.0063)	(.0038)	(.0031)
4	.0090	.0197	.0197	.8170	.1083	.0263	.2793
	(.0019)	(.0027)	(.0027)	(.0076)	(.0061)	(.0032)	(.0044)
5	.0085	.0089	.0219	.1470	.7373	.0764	.2154
	(.0018)	(.0018)	(.0028)	(.0068)	(.0084)	(.0051)	(.0041)
6	.0057	.0201	.0138	.0920	.1730	.6953	.0869
	(.0019)	(.0035)	(.0029)	(.0073)	(.0095)	(.0116)	(.0028)

B. Average Mobility Over the 1979-1985 Period

From	To 1	2	3	4	5	6	Relative Size
1	.8413	.0750	.0329	.0361	.0079	.0067	.1692
	(.0091)	(.0066)	(.0044)	(.0047)	(.0022)	(.0020)	(.0034)
2	.0703	.8096	.0668	.0338	.0096	.0098	.1741
	(.0066)	(.0101)	(.0064)	(.0046)	(.0025)	(.0025)	(.0035)
3	.0537	.1005	.7243	.0445	.0378	.0391	.1112
	(.0066)	(.0088)	(.0130)	(.0060)	(.0056)	(.0056)	(.0029)
4	.0276	.0363	.0178	.7947	.0888	.0348	.2657
	(.0030)	(.0034)	(.0024)	(.0073)	(.0052)	(.0033)	(.0041)
5	.0096	.0117	.0170	.1261	.7771	.0586	.1961
	(.0018)	(.0019)	(.0023)	(.0060)	(.0075)	(.0043)	(.0036)
6	.0110	.0433	.0475	.0902	.1693	.6387	.0837
	(.0028)	(.0054)	(.0057)	(.0076)	(.0099)	(.0127)	(.0025)

C. Average Mobility Over the 1989-1995 Period

From	To 1	2	3	4	5	6	Relative Size
1	.8221	.0912	.0288	.0333	.0146	.0100	.1985
	(.0082)	(.0061)	(.0036)	(.0038)	(.0026)	(.0021)	(.0034)
2	.0916	.7427	.0735	.0579	.0170	.0174	.1939
	(.0063)	(.0096)	(.0057)	(.0051)	(.0028)	(.0029)	(.0034)
3	.0642	.1280	.6946	.0316	.0357	.0459	.1179
	(.0064)	(.0087)	(.0119)	(.0045)	(.0048)	(.0054)	(.0028)
4	.0427	.0493	.0209	.7592	.0809	.0470	.2138
	(.0036)	(.0038)	(.0026)	(.0076)	(.0048)	(.0038)	(.0035)
5	.0198	.0198	.0226	.1009	.7688	.0681	.1846
	(.0025)	(.0025)	(.0027)	(.0054)	(.0076)	(.0045)	(.0033)
6	.0221	.0411	.0474	.1028	.1489	.6377	.0912
	(.0036)	(.0048)	(.0051)	(.0074)	(.0086)	(.0116)	(.0025)

Note. - Cell ij represents the average (over the period) percent of those working in occupation i in a given year who will work in occupation j the following year. Occupational groups are defined as: 1. Professional, technical, and kindred workers; 2. Managers, officials, and proprietors; 3. Clerical and sales workers; 4. Craftsmen, foremen, and kindred workers; 5. Operatives and kindred workers; 6. Laborers and service workers. Standard errors are in parentheses.

Figure 1: Occupational Mobility, One Digit Level, Retrospective and Original PSID Files, 1969-1980.
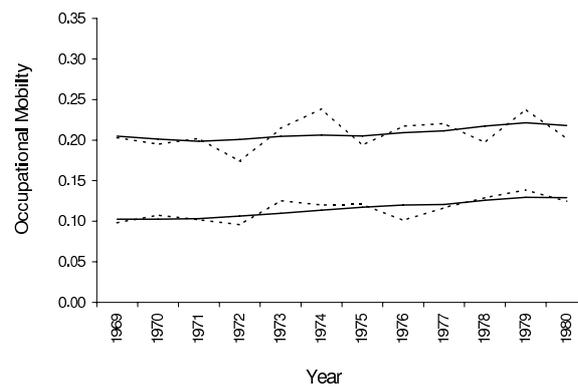
Notes: The dotted lines show the actual level of occupational mobility - the higher one is computed on the originally coded data while the lower one is computed on the Retrospective Files. The solid lines show the estimated trend in occupational mobility from a linear probability model - the higher one is computed on the originally coded data while the lower one is computed on the Retrospective Files.

Figure 2: Occupational and Industry Mobility in the United States, 1969-1997, Linear Probability Model.

Occupational Mobility   Industry Mobility

a) One digit level

b) Two digit level
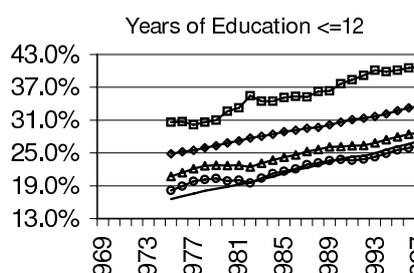
c) Three digit level

Occupational mobility
Fitted occupational mobility

Industry mobility
Fitted industry mobility
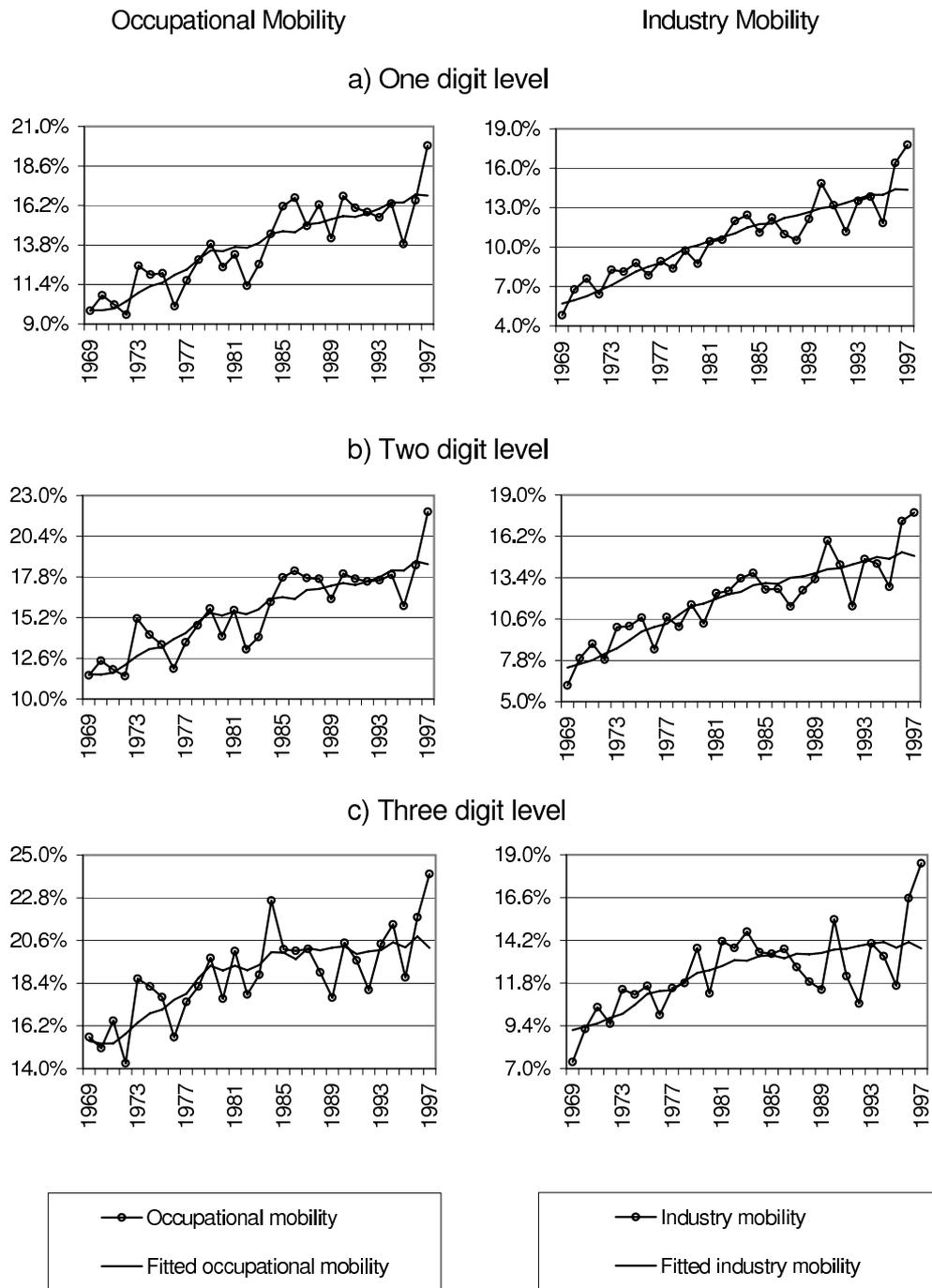
Figure 3: Occupational and Industry Mobility in the United States, 1969-1997, Probit Regression.
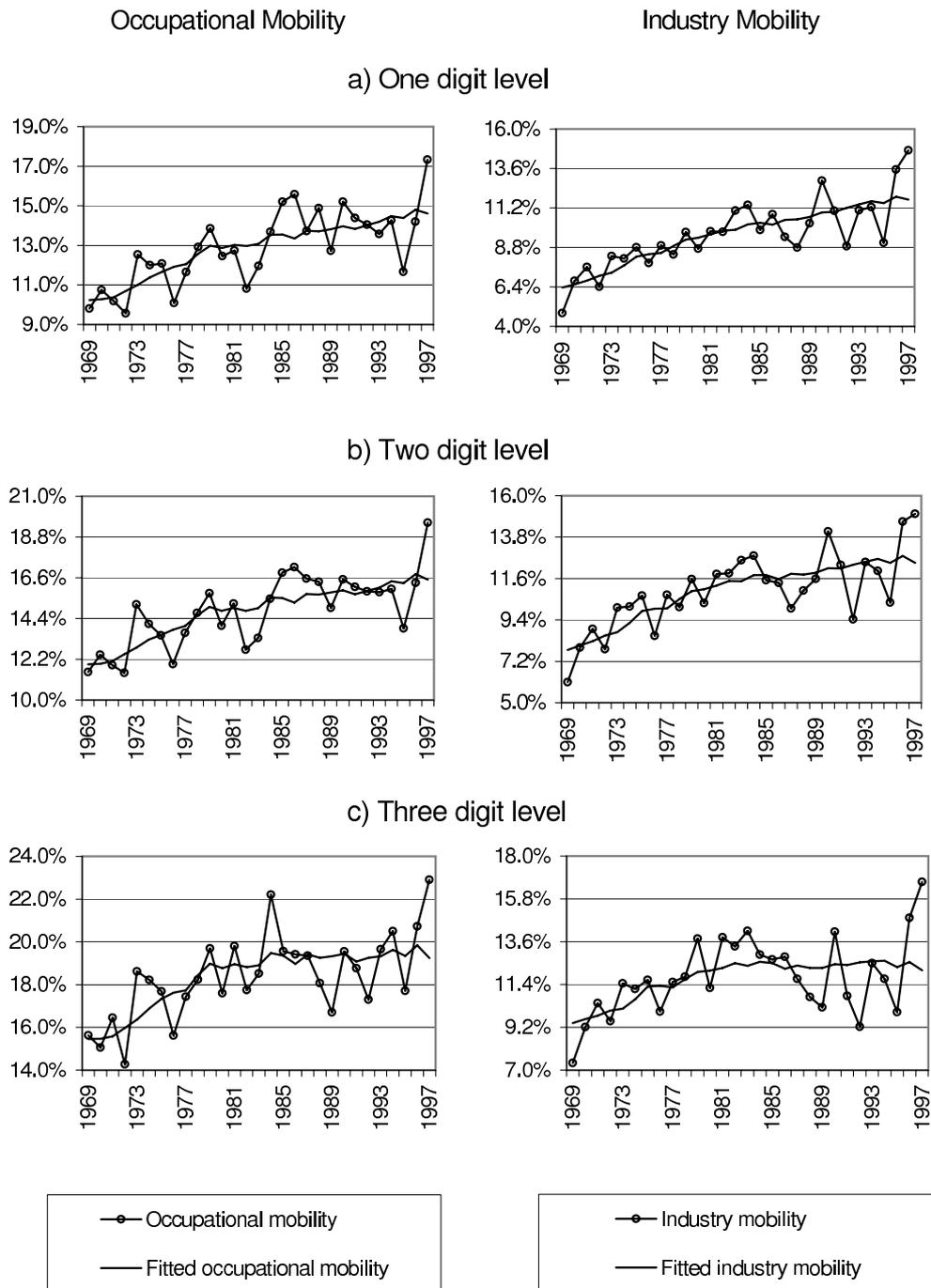
Figure 4: Occupational Mobility in the United States by Age and Education Levels, 1969-1997.

High School and Less   Some College and College

a) One digit level

c) Three digit level

| 23-28 | 29-34 | 35-40 |
| 41-46 | 47-61 | |

| 23-28 | 29-34 | 35-40 |
| 41-46 | 47-61 | |
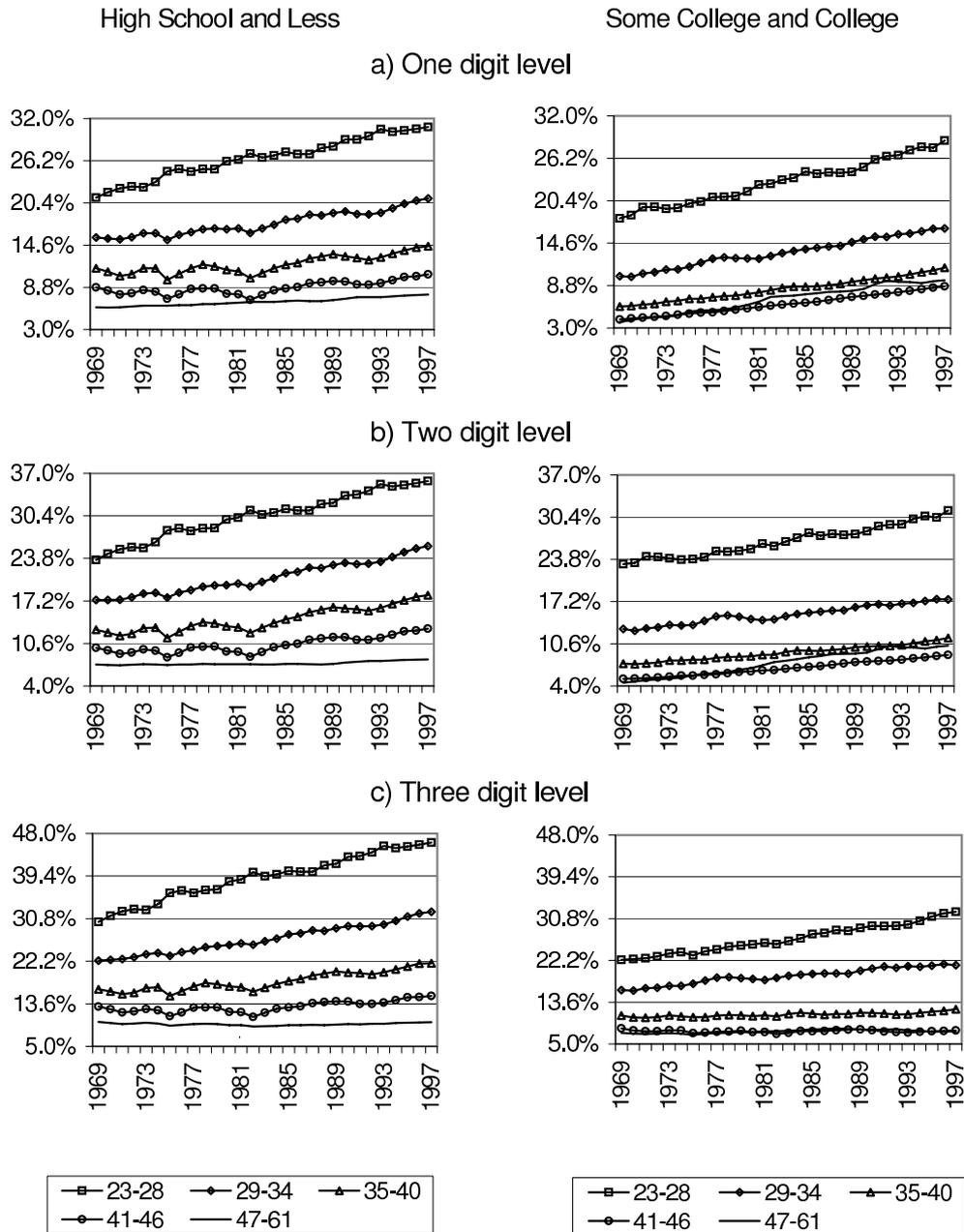
Note: The figure shows the fitted occupational mobility values for various age-education groups. See the text for further details regarding the procedure that is used in obtaining the fitted values.

Figure 5: Industry Mobility in the United States by Age and Education Levels, 1969-1997.
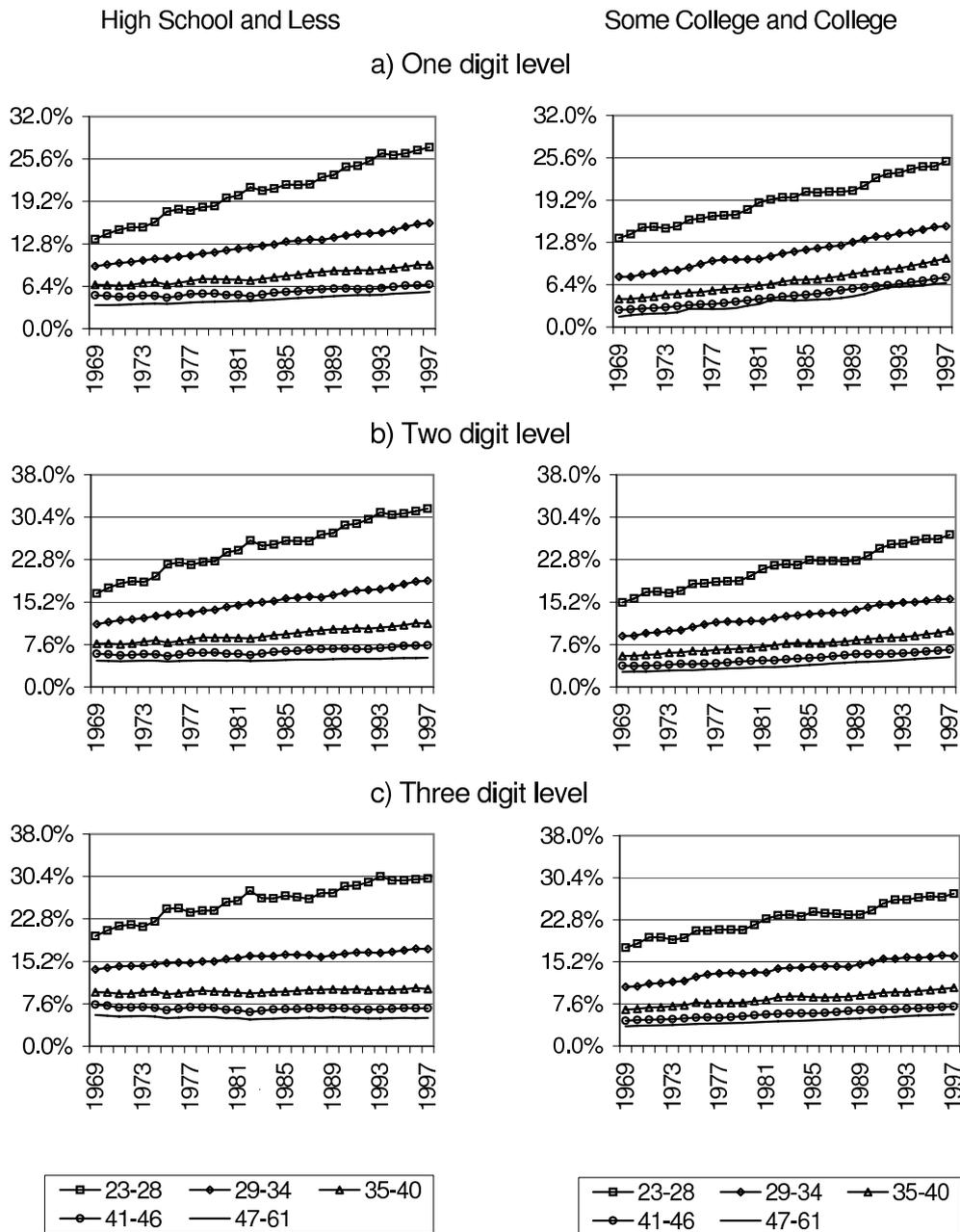
Note: The figure shows the fitted industry mobility values for various age-education groups. See the text for further details regarding the procedure that is used in obtaining the fitted values.

Figure 6: Occupational and Industry Mobility in the United States, 1969-1997, Probit Regression, Constant 1980 Population Structure.

Occupational Mobility   Industry Mobility

a) One digit level

b) Two digit level

c) Three digit level
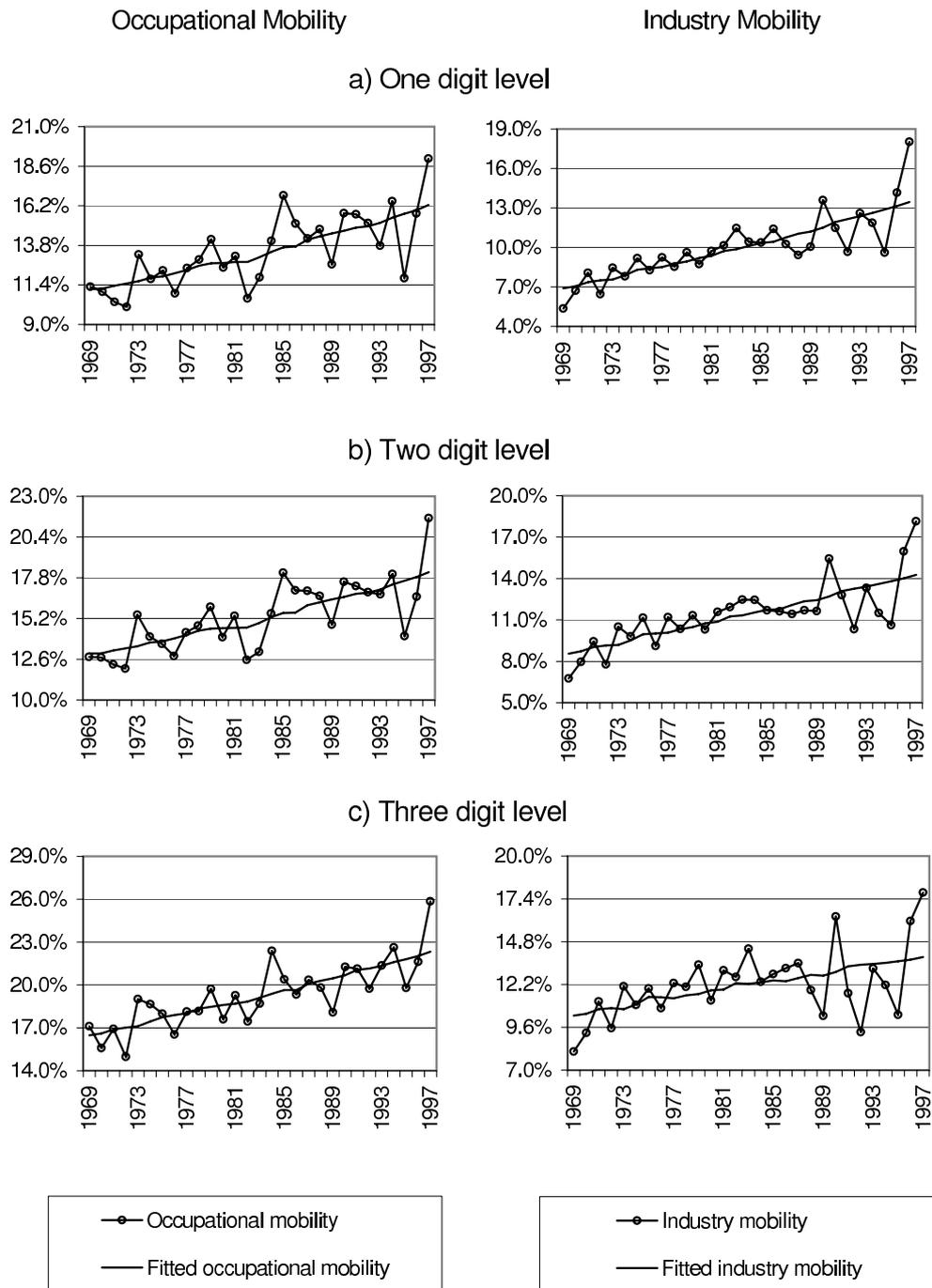
Figure 7: Occupational and Industry Mobility in the United States, 1969-1997, Original PSID Coding.

Occupational mobility   Industry mobility

a) One digit level
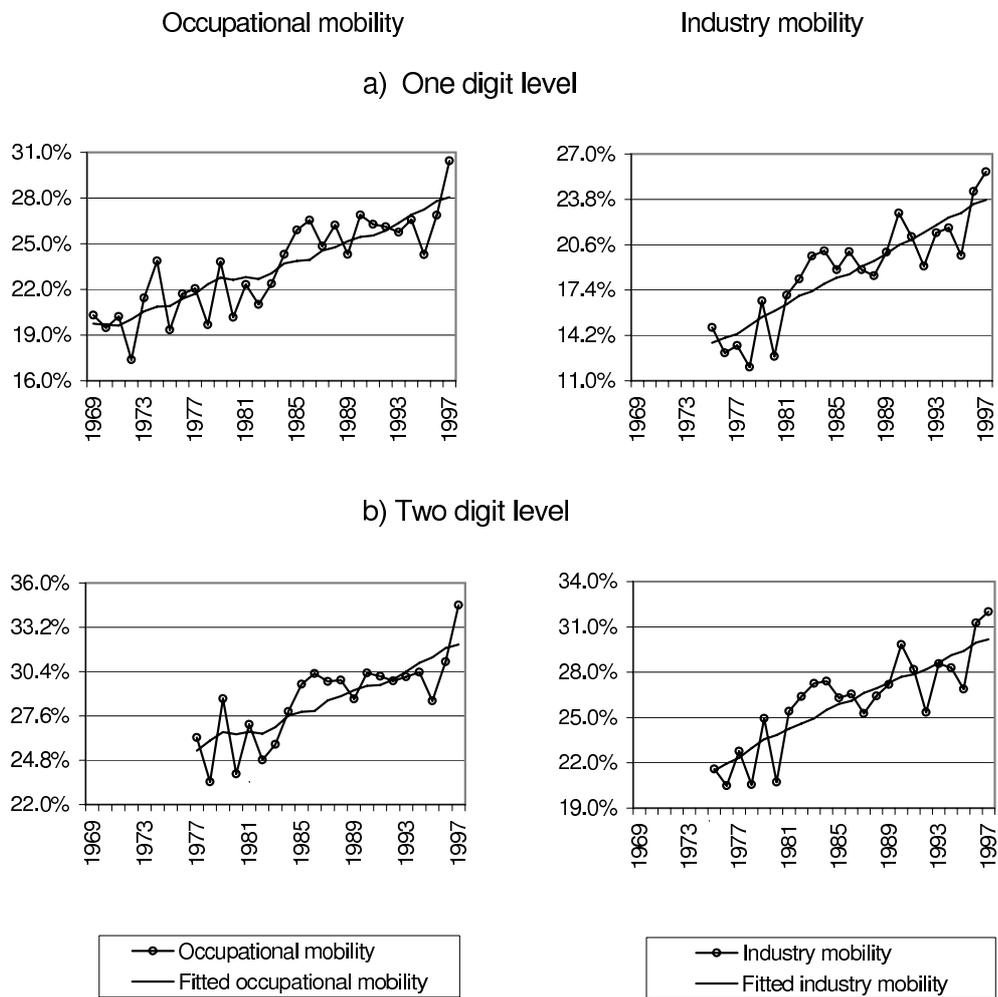
b) Two digit level

Note: Vertical scale is different in each panel.

Figure 8: Occupational and Industry Mobility in the United States by Age and Education Levels, 1969-1997, Original PSID Coding.

Occupational Mobility

a) One digit level

Years of Education <=12 / Years of Education >12

b) Two digit level

Years of Education <=12 / Years of Education >12

Industry Mobility

a) One digit level

Years of Education <=12 / Years of Education >12

b) Two digit level

Years of Education <=12 / Years of Education >12

Legend: 23-28, 29-34, 35-40, 41-46, 47-61
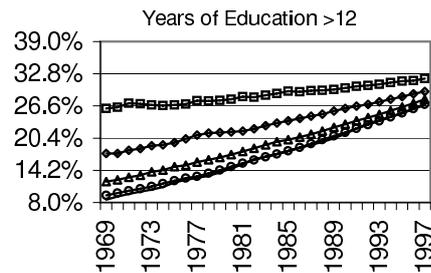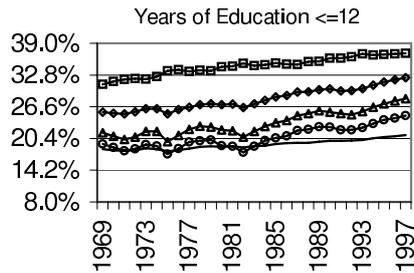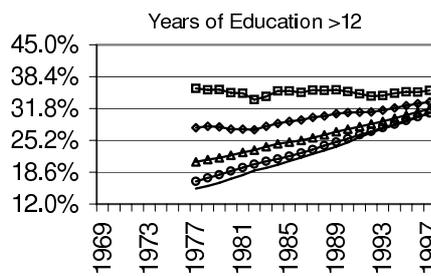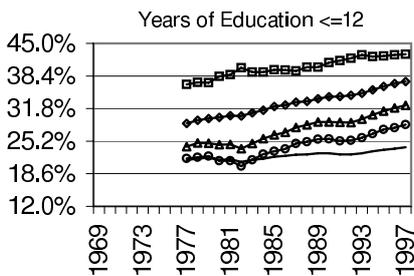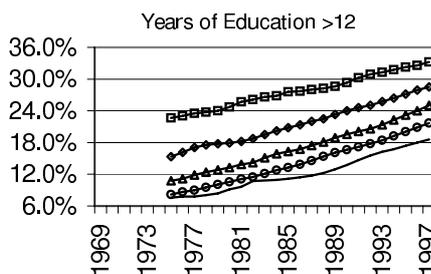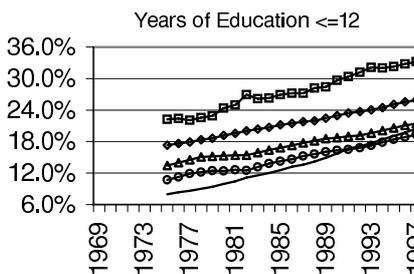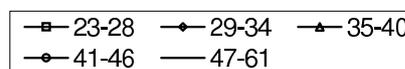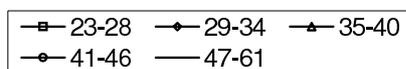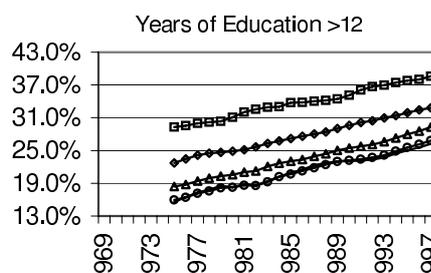
Figure 9: Occupational Mobility in the United States, 1969-1997, Two Digit Level: Different Sample Restrictions.
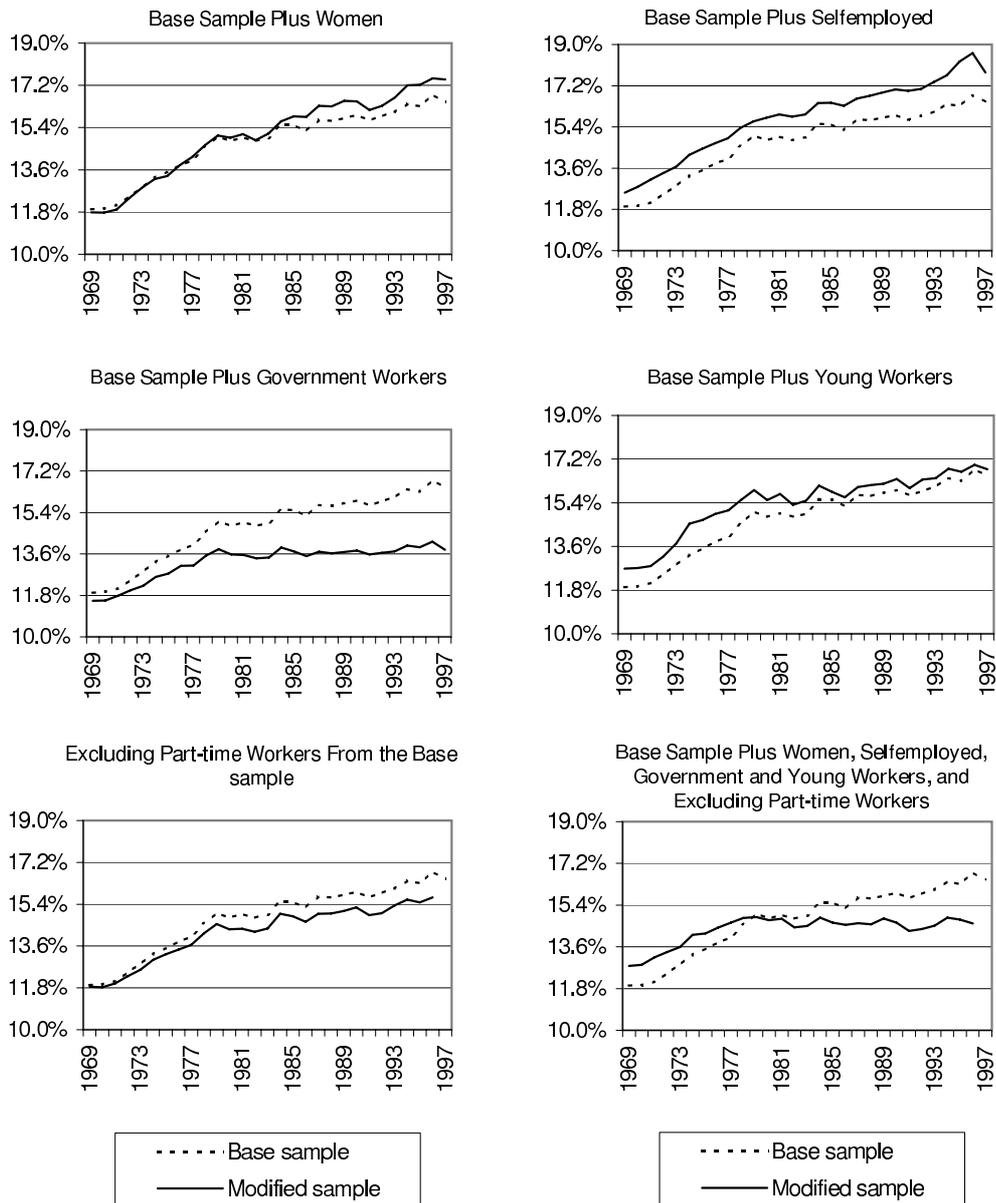
Notes: The base sample includes male heads of household, aged 23-61, who are not self-employed, or dual-employed and are not working for the government. The graphs show the fitted occupational mobility values for various sample restrictions. See text for further details regarding the procedure used in obtaining the fitted values.

Figure 10: Occupational Mobility in the United States, 1969-1997, Two Digit Level.
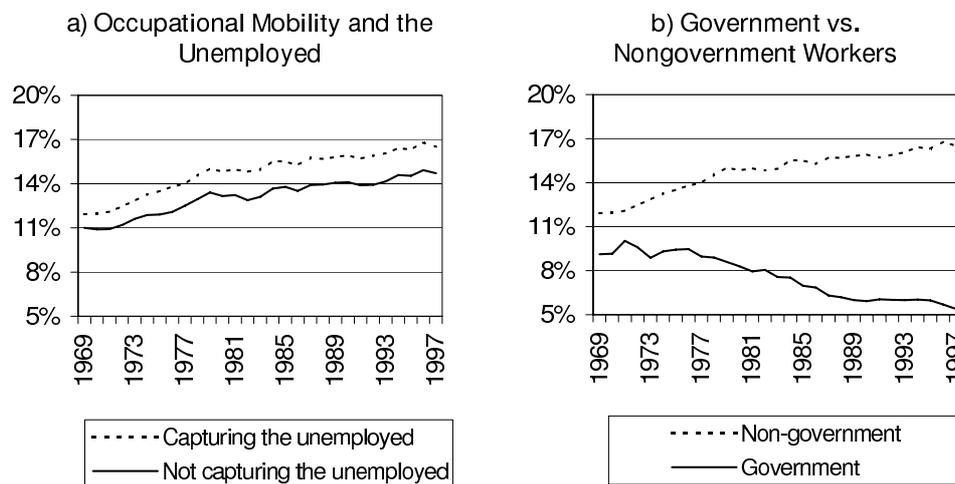
Notes: The dotted line on panels a) and b) shows occupational mobility on our base sample which includes male heads of household, aged 23-61, who are not self-employed, or dual-employed, and are not working for the government. The solid line on panel a) shows occupational mobility when the base sample is restricted to those employed in both years. The solid line in panel b) shows occupational mobility when we consider the sample of government workers only.

Figure 11: Net Occupational Mobility in the United States, 1970-1997.

a) One digit level

b) Two digit level

c) Three digit level

——— Net occupational mobility
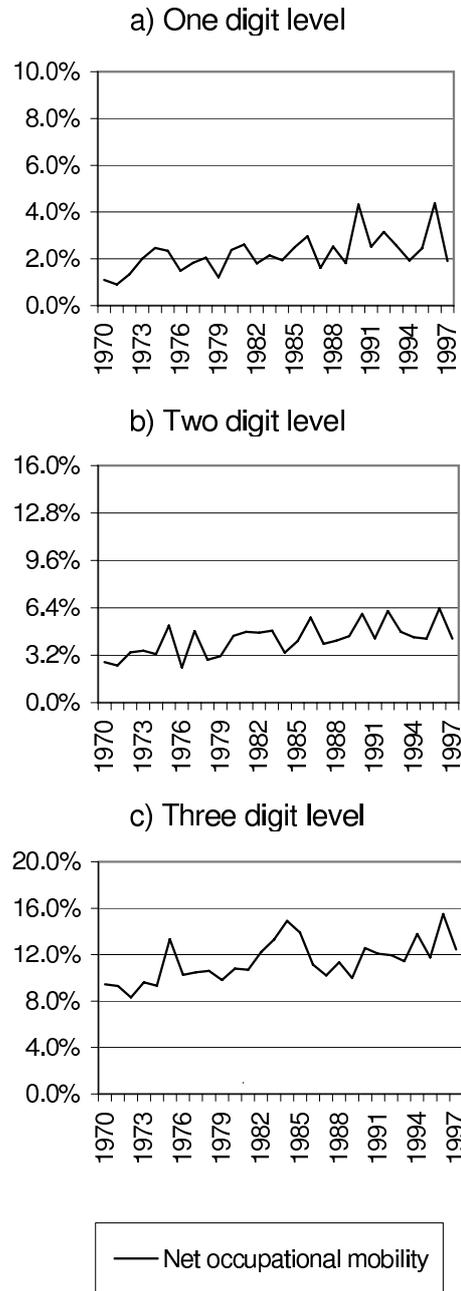
Notes: The graphs show the fitted values of net occupational mobility. See text for further details regarding the procedure used in obtaining the fitted values.

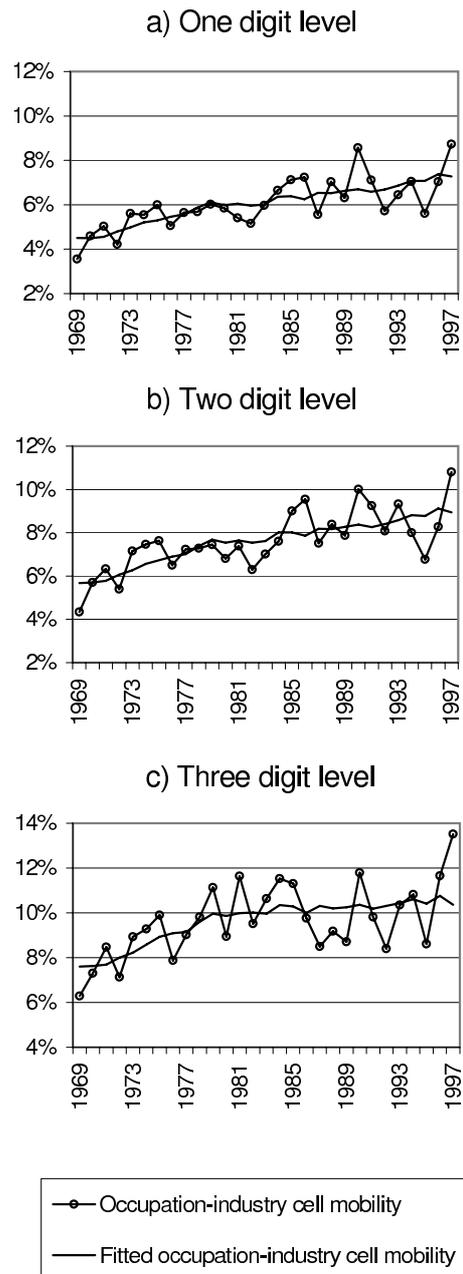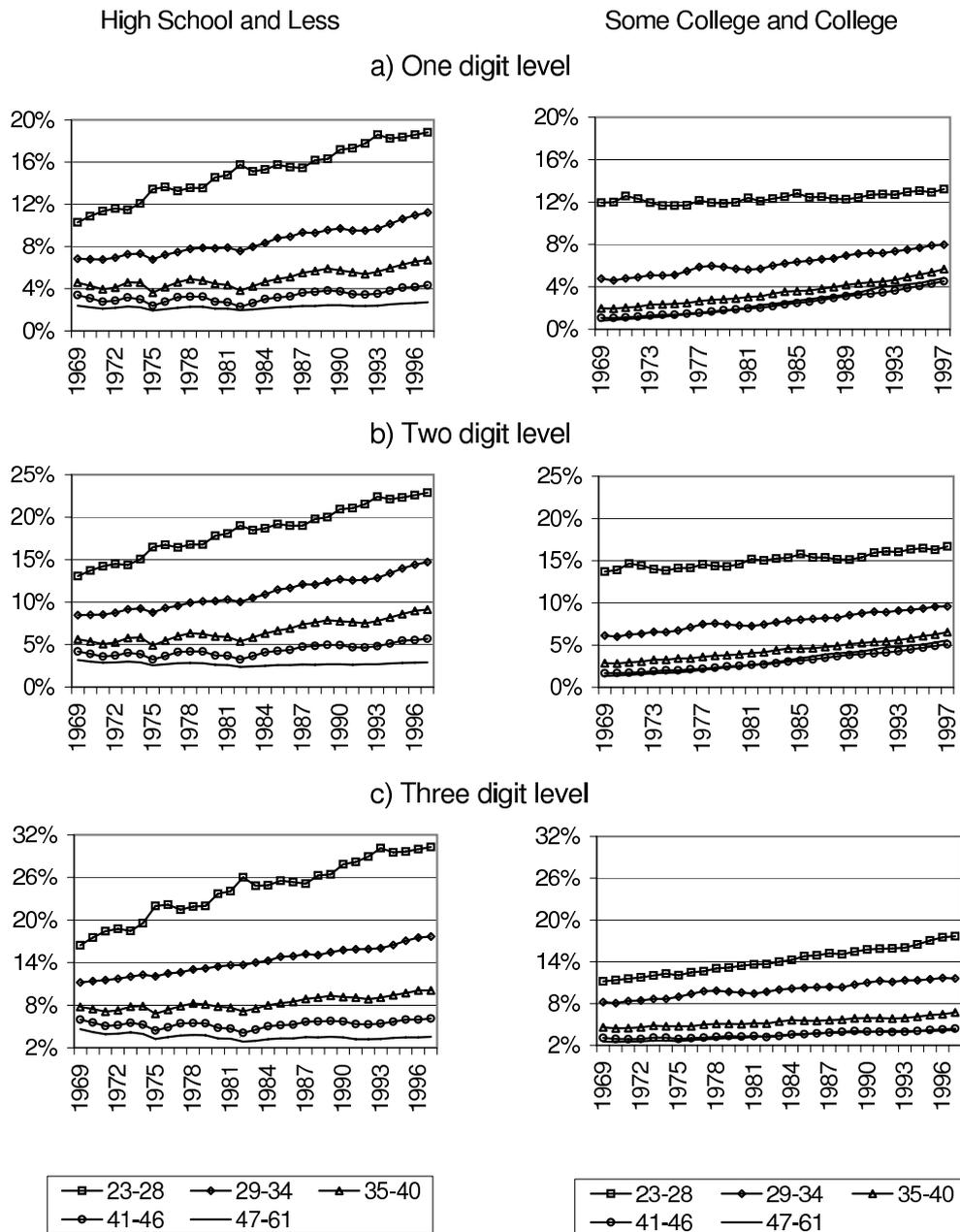Figure 12: Mobility across Occupation-Industry Cells in the United States, 1969-1997, Probit Regression.

a) One digit level

b) Two digit level

c) Three digit level

Occupation-industry cell mobility

Fitted occupation-industry cell mobility

Figure 13: Mobility across Occupation-Industry Cells in the United States by Age and Education Levels, 1969-1997.

High School and Less   Some College and College

a) One digit level

b) Two digit level

c) Three digit level

23-28   29-34   35-40   41-46   47-61

Note: The figure shows the fitted values of mobility across occupation-industry cells for various age-education groups. See the text for further details regarding the procedure that is used in obtaining the fitted values.

Figure 14: Occupational Mobility over the Business Cycle, by Age and Education, Three Digit Level.

a) High School and Less

b) Some College and College
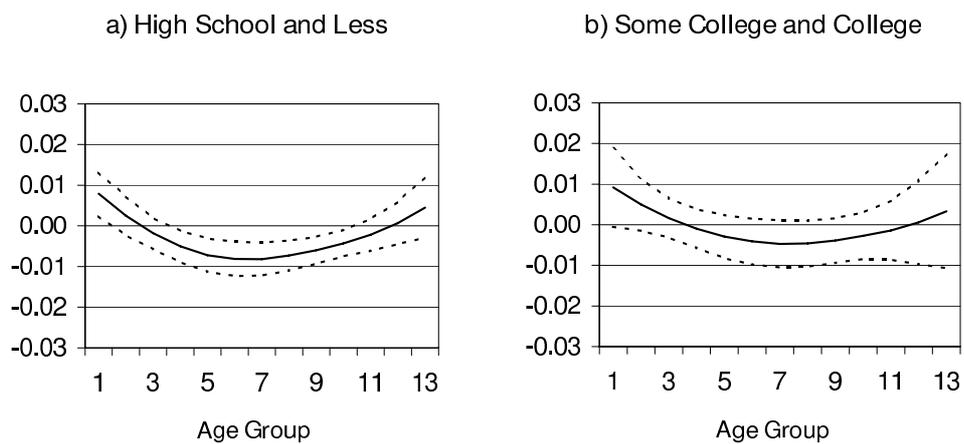
Notes: The solid lines show the effect of a marginal increase in the unemployment rate on occupational mobility for each of the 13 three-year age groups starting from the age of 23. The dotted lines show the respective 95% confidence intervals.

I Three-Digit Occupational and Industry Codes

Three-Digit Occupation Classification System.[30]

PROFESSIONAL, TECHNICAL,
AND KINDRED WORKERS
001 Accountants
002 Architects

Computer specialists
003 Computer programmers
004 Computer systems analysts
005 Computer specialists, not elsewhere classified

Engineers
006 Aeronautical and astronautical engineers
010 Chemical engineers
011 Civil engineers
012 Electrical and electronic engineers
013 Industrial engineers
014 Mechanical engineers
015 Metallurgical and materials engineers
020 Mining engineers
021 Petroleum engineers
022 Sales engineers
023 Engineers, not elsewhere classified
024 Farm management advisors
025 Foresters and conservationists
026 Home management advisors Lawyers and judges
030 Judges
031 Lawyers

Librarians, archivists, and curators
032 Librarians
033 Archivists and curators

Mathematical specialists
034 Actuaries
035 Mathematicians
036 Statisticians

Life and physical scientists
042 Agricultural scientists
043 Atmospheric and space scientists
044 Biological scientists
045 Chemists
051 Geologists

052 Marine scientists
053 Physicists and astronomers
054 Life and physical scientists, not elsewhere classified
055 Operations and systems researchers and analysts
056 Personnel and labor relations workers, Physicians, dentists, and related practitioners
061 Chiropractors
062 Dentists
063 Optometrists
064 Pharmacists
065 Physicians, medical and osteopathic
071 Podiatrists
072 Veterinarians
073 Health practitioners, not elsewhere classified

Nurses, dietitians, and therapists
074 Dietitians
075 Registered nurses
076 Therapists

Health technologists and technicians
080 Clinical laboratory technologists and technicians
081 Dental hygienists
082 Health record technologists and technicians
083 Radiologic technologists and technicians
084 Therapy assistants
085 Health technologists and technicians, not elsewhere classified

Religious workers
086 Clergymen
090 Religious workers, not elsewhere classified

Social scientists
091 Economists
092 Political scientists
093 Psychologists
094 Sociologists
095 Urban and regional planners
096 Social scientists, not elsewhere classified

Social and recreation workers
100 Social workers
101 Recreation workers

Teachers, college and university
102 Agriculture teachers
103 Atmospheric, earth, marine, and space teachers
104 Biology teachers
105 Chemistry teachers
110 Physics teachers

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[30]Source: PSID wave XIV - 1981 documentation, Appendix 2: Industry and Occupation Codes.

111 Engineering teachers
112 Mathematics teachers
113 Health specialties teachers
114 Psychology teachers
115 Business and commerce teachers
116 Economics teachers
120 History teachers
121 Sociology teachers
122 Social science teachers, not elsewhere classified
123 Art, drama, and music teachers
124 Coaches and physical education teachers
125 Education teachers
126 English teachers
130 Foreign language teachers
131 Home economics teachers
132 Law teachers
133 Theology teachers
134 Trade, industrial, and technical teachers
135 Miscellaneous teachers, college and university
140 Teachers, college and university, subject
    not specified

  Teachers, except college and university
141 Adult education teachers
142 Elementary school teachers
143 Prekindergarten and kindergarten teachers
144 Secondary school teachers
145 Teachers, except college and university,
    not elsewhere classified

  Engineering and science technicians
150 Agriculture and biological technicians, except health
151 Chemical technicians
152 Draftsmen
153 Electrical and electronic engineering technicians
154 Industrial engineering technicians
155 Mechanical engineering technicians
156 Mathematical technicians
161 Surveyors
162 Engineering and science technicians,
    not elsewhere classified

  Technicians, except health, and engineering
  and science
163 Airplane pilots
164 Air traffic controllers
165 Embalmers
170 Flight engineers
171 Radio operators
172 Tool programmers, numerical control
173 Technicians, not elsewhere classified
174 Vocational and educational counselors
  Writers, artists, and entertainers
175 Actors
180 Athletes and kindred workers
181 Authors
182 Dancers
183 Designers

184 Editors and reporters
185 Musicians and composers
190 Painters and sculptors
191 Photographers
192 Public relations men and publicity writers
193 Radio and television announcers
194 Writers, artists, and entertainers,
    not elsewhere classified
195 Research workers, not specified

  MANAGERS AND ADMINISTRATORS,
  EXCEPT FARM
201 Assessors, controllers, and treasurers;
    local public administration
202 Bank officers and financial managers
203 Buyers and shippers, farm products
205 Buyers, wholesale and retail trade
210 Credit men
211 Funeral directors
212 Health administrators
213 Construction inspectors, public administration
215 Inspectors, except construction, public
    administration
216 Managers and superintendents, building
220 Office managers, not elsewhere classified
221 Officers, pilots, and pursers; ship
222 Officials and administrators; public
    administration, not elsewhere classified
223 Officials of lodges, societies, and unions
224 Postmasters and mail superintendents
225 Purchasing agents and buyers, not elsewhere
    classified
226 Railroad conductors
230 Restaurant, cafeteria, and bar managers
231 Sales managers and department heads, retail trade
233 Sales managers, except retail trade
235 School administrators, college
240 School administrators, elementary and secondary
245 Managers and administrators, not elsewhere
    classified

  SALES WORKERS
260 Advertising agents and salesmen
261 Auctioneers
262 Demonstrators
264 Hucksters and peddlers
265 Insurance agents, brokers, and underwriters
266 Newsboys
270 Real estate agents and brokers
271 Stock and bond salesmen
280 Salesmen and sales clerks, not elsewhere classified

  Salesmen were divided into 5 categories
  dependent on industry. The industry codes
  are shown in parentheses.
281 Sales representatives, manufacturing industries
    (Ind. 107-399)
282 Sales representatives, wholesale trade

(Ind. 017-058, 507-599)
283 Sales clerks, retail trade
  (Ind. 608-699 except 618, 639, 649, 667, 668, 688)
284 Salesmen, retail trade
  (Ind. 607, 618, 639, 649, 667, 668, 688)
285 Salesmen of services and construction
  (Ind. 067-078, 407-499, 707-947)

CLERICAL AND KINDRED WORKERS
301 Bank tellers
303 Billing clerks
305 Bookkeepers
310 Cashiers
311 Clerical assistants, social welfare
312 Clerical supervisors, not elsewhere classified
313 Collectors, bill and account
314 Counter clerks, except food
315 Dispatchers and starters, vehicle
320 Enumerators and interviewers
321 Estimators and investigators, not elsewhere
  classified
323 Expediters and production controllers
325 File clerks
326 Insurance adjusters, examiners, and investigators
330 Library attendants and assistants
331 Mail carriers, post office
332 Mail handlers, except post office
333 Messengers and office boys
334 Meter readers, utilities

Office machine operators
341 Bookkeeping and billing machine operators
342 Calculating machine operators
343 Computer and peripheral equipment operators
344 Duplicating machine operators
345 Key punch operators
350 Tabulating machine operators
355 Office machine operators, not elsewhere classified
360 Payroll and timekeeping clerks
361 Postal clerks
362 Proofreaders
363 Real estate appraisers
364 Receptionists

Secretaries
370 Secretaries, legal
371 Secretaries, medical
372 Secretaries, not elsewhere classified
374 Shipping and receiving clerks
375 Statistical clerks
376 Stenographers
381 Stock clerks and storekeepers
382 Teacher aides, except school monitors
383 Telegraph messengers
384 Telegraph operators
385 Telephone operators
390 Ticket, station, and express agents
391 Typists

392 Weighers
394 Miscellaneous clerical workers
395 Not specified clerical workers

CRAFTSMEN AND KINDRED WORKERS
401 Automobile accessories installers
402 Bakers
403 Blacksmiths
404 Boilermakers
405 Bookbinders
410 Brickmasons and stonemasons
411 Brickmasons and stonemasons, apprentices
412 Bulldozer operators
413 Cabinetmakers
415 Carpenters
416 Carpenter apprentices
420 Carpet installers
421 Cement and concrete finishers
422 Compositors and typesetters
423 Printing trades apprentices, except pressmen
424 Cranemen, derrickmen, and hoistmen
425 Decorators and window dressers
426 Dental laboratory technicians
430 Electricians
431 Electrician apprentices
433 Electric power linemen and cablemen
434 Electrotypers and stereotypers
435 Engravers, except photoengravers
436 Excavating, grading, and road machine
  operators, except bulldozer
440 Floor layers, except tile setters
441 Foremen, not elsewhere classified
442 Forgemen and hammermen
443 Furniture and wood finishers
444 Furriers
445 Glaziers
446 Heat treaters, annealers, and temperers
450 Inspectors, scalers, and graders; log and
  lumber
452 Inspectors, not elsewhere classified
453 Jewelers and watchmakers
454 Job and die setters, metal
455 Locomotive engineers
456 Locomotive firemen
461 Machinists
462 Machinist apprentices

Mechanics and repairmen
470 Air conditioning, heating, and refrigeration
471 Aircraft
472 Automobile body repairmen
473 Automobile mechanics
474 Automobile mechanic apprentices
475 Data processing machine repairmen
480 Farm implement
481 Heavy equipment mechanics, including diesel
482 Household appliance and accessory installers
  and mechanics

483 Loom fixers
484 Office machine
485 Radio and television
486 Railroad and car shop
491 Mechanic, except auto, apprentices
492 Miscellaneous mechanics and repairmen
495 Not specified mechanics and repairmen
501 Millers; grain, flour, and feed
502 Millwrights
503 Molders, metal
504 Molder apprentices
505 Motion picture protectionists
506 Opticians, and lens grinders and polishers
510 Painters, construction and maintenance
511 Painter apprentices
512 Paperhangers
514 Pattern and model makers, except paper
515 Photoengravers and lithographers
516 Piano and organ tuners and repairmen
520 Plasterers
521 Plasterer apprentices
522 Plumbers and pipe fitters
523 Plumber and pipe fitter apprentices
525 Power station operators
530 Pressmen and plate printers, printing
531 Pressman apprentices
533 Rollers and finishers, metal
534 Roofers and slaters
535 Sheetmetal workers and tinsmiths
536 Sheetmetal apprentices
540 Shipfitters
542 Shoe repairmen
543 Sign painters and letterers
545 Stationary engineers
546 Stone cutters and stone carvers
550 Structural metal craftsmen
551 Tailors
552 Telephone installers and repairmen
554 Telephone linemen and splicers
560 Tile setters
561 Tool and die makers
562 Tool and die maker apprentices
563 Upholsterers
571 Specified craft apprentices, not elsewhere
    classified
572 Not specified apprentices
575 Craftsmen and kindred workers, not elsewhere
    classified

ARMED FORCES
600 Members of armed forces

OPERATIVES, EXCEPT TRANSPORT
601 Asbestos and insulation workers
602 Assemblers
603 Blasters and powdermen
604 Bottling and canning operatives
605 Chainmen, rodmen, and axmen; surveying

610 Checkers, examiners, and inspectors;
    manufacturing
611 Clothing ironers and pressers
612 Cutting operatives, not elsewhere classified
613 Dressmakers and seamstresses, except factory
614 Drillers, earth
615 Dry wall installers and lathers
620 Dyers
621 Filers, polishers, sanders, and buffers
622 Furnacemen, smeltermen, and pourers
623 Garage workers and gas station attendants
624 Graders and sorters, manufacturing
625 Produce graders and packers, except factory
    and farm
626 Heaters, metal
630 Laundry and dry cleaning operatives, not
    elsewhere classified
631 Meat cutters and butchers, except
    manufacturing
633 Meat cutters and butchers, manufacturing
634 Meat wrappers, retail trade
635 Metal platers
636 Milliners
640 Mine operatives, not elsewhere classified
641 Mixing operatives
642 Oilers and greasers, except auto
643 Packers and wrappers,except meat and produce
644 Painters, manufactured articles
645 Photographic process workers

Precision machine operatives
650 Drill press operatives
651 Grinding machine operatives
652 Lathe and milling machine operatives
653 Precision machine operatives, not elsewhere
    classified
656 Punch and stamping press operatives
660 Riveters and fasteners
661 Sailors and deckhands
662 Sawyers
663 Sewers and stitchers
664 Shoemaking machine operatives
665 Solderers
666 Stationary firemen

Textile operatives
670 Carding, lapping, and combing operatives
671 Knitters, loopers, and toppers
672 Spinners, twisters, and winders
673 Weavers
674 Textile operatives, not elsewhere classified
680 Welders and flame-cutters
681 Winding operatives, not elsewhere classified
690 Machine operatives, miscellaneous specified
692 Machine operatives, not specified
694 Miscellaneous operatives
695 Not specified operatives

TRANSPORT EQUIPMENT OPERATIVES
701 Boatmen and canalmen
703 Bus drivers
704 Conductors and motormen, urban rail transit
705 Deliverymen and routemen
706 Fork lift and tow motor operatives
710 Motormen; mine, factory, logging camp, etc.
711 Parking attendants
712 Railroad brakemen
713 Railroad switchmen
714 Taxicab drivers and chauffeurs
715 Truck drivers

LABORERS, EXCEPT FARM
740 Animal caretakers, except farm
750 Carpenters' helpers
751 Construction laborers, except carpenters' helpers
752 Fishermen and oysterman
753 Freight and material handlers
754 Garbage collectors
755 Gardeners and groundskeepers, except farm
760 Longshoremen and stevedores
761 Lumbermen, raftsmen, and woodchoppers
762 Stock handlers
763 Teamsters
764 Vehicle washers and equipment cleaners
770 Warehousemen, not elsewhere classified
780 Miscellaneous laborers
785 Not specified laborers

FARMERS AND FARM MANAGERS
801 Farmers (owners and tenants)
802 Farm managers

FARM LABORERS AND FARM FOREMEN
821 Farm foremen
822 Farm laborers, wage workers
823 Farm laborers, unpaid family workers
824 Farm service laborers, self-employed

SERVICE WORKERS, EXCEPT PRIVATE HOUSEHOLD
Cleaning service workers
901 Chambermaids and maids, except private household
902 Cleaners and charwomen
903 Janitors and sextons

Food service workers
910 Bartenders
911 Busboys
912 Cooks, except private household
913 Dishwashers
914 Food counter and fountain workers
915 Waiters

916 Food service workers, not elsewhere classified, except private household

Health service workers
921 Dental assistants
922 Health aides, except nursing
923 Health trainees
924 Lay midwives
925 Nursing aides, orderlies, and attendants
926 Practical nurses

Personal service workers
931 Airline stewardesses
932 Attendants, recreation and amusement
933 Attendants, personal service, not elsewhere classified
934 Baggage porters and bellhops
935 Barbers
940 Boarding and lodging house keepers
941 Bootblacks
942 Child care workers, except private household
943 Elevator operators
944 Hairdressers and cosmetologists
945 Personal service apprentices
950 Housekeepers, except private household
952 School monitors
953 Ushers, recreation and amusement
954 Welfare service aides

Protective service workers
960 Crossing guards and bridge tenders
961 Firemen, fire protection
962 Guards and watchmen
963 Marshals and constables
964 Policemen and detectives
965 Sheriffs and bailiffs

PRIVATE HOUSEHOLD WORKERS
980 Child care workers, private household
981 Cooks, private household
982 Housekeepers, private household
983 Laundresses, private household
984 Maids and servants, private household

Three-Digit Industry Classification System.[31]

AGRICULTURE, FORESTRY, AND FISHERIES
017 Agricultural production
018 Agricultural services, except horticultural
019 Horticultural services
027 Forestry
028 Fisheries

MINING
047 Metal mining
048 Coal mining
049 Crude petroleum and natural gas extractions
057 Nonmetallic mining and quarrying, except fuel

CONSTRUCTION
067 General building contractors
068 General contractors, except building
069 Special trade contractors
077 Not specified construction

MANUFACTURING-Durable Goods
Lumber and wood products, except furniture
107 Logging
108 Sawmills, planing mills, and mill work
109 Miscellaneous wood products
118 Furniture and fixtures

Stone, clay, and glass products
119 Glass and glass products
127 Cement, concrete, gypsum, and plaster products
128 Structural clay products
137 Pottery and related products
138 Miscellaneous nonmetallic mineral and stone products

Metal industries
139 Blast furnaces, steel works, rolling and finishing mills
147 Other primary iron and steel industries
148 Primary aluminum industries
149 Other primary nonferrous industries
157 Cutlery, hand tools, and other hardware
158 Fabricated structural metal products
159 Screw machine products
167 Metal stamping
168 Miscellaneous fabricated metal products
169 Not specified metal industries

Machinery, except electrical
177 Engines and turbines
178 Farm machinery and equipment
179 Construction and material handling machines
187 Metalworking machinery

188 Office and accounting machines
189 Electronic computing equipment
197 Machinery, except electrical, not elsewhere classified
198 Not specified machinery

Electrical machinery, equipment, and supplies
199 Household appliances
207 Radio, T.V., and communication equipment
208 Electrical machinery, equipment, and supplies, not elsewhere classified
209 Not specified electrical machinery, equipment, and supplies

Transportation equipment
219 Motor vehicles and motor vehicle equipment
227 Aircraft and parts
228 Ship and boat building and repairing
229 Railroad locomotives and equipment
237 Mobile dwellings and campers
238 Cycles and miscellaneous transportation equipment

Professional and photographic equipment, and watches
239 Scientific and controlling instruments
247 Optical and health services supplies
248 Photographic equipment and supplies
249 Watches, clocks, and clockwork-operated devices
257 Not specified professional equipment
258 Ordnance
259 Miscellaneous manufacturing industries

MANUFACTURING-Nondurable Goods
Food and kindred products
268 Meat products
269 Dairy products
278 Canning and preserving fruits, vegetables, seafoods
279 Grain-mill products
287 Bakery products
288 Confectionery and related products
289 Beverage industries
297 Miscellaneous food preparation and kindred products
298 Not specified food industries
299 Tobacco manufactures

Textile mill products
307 Knitting mills
308 Dyeing and finishing textiles, except wool and knit goods
309 Floor coverings, except hard surface
317 Yarn, thread, and fabric mills
318 Miscellaneous textile mill products

Apparel and other fabricated textile products
319 Apparel and accessories
327 Miscellaneous fabricated textile products

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[31]Source: PSID wave XIV - 1981 documentation, Appendix 2: Industry and Occupation Codes.

Paper and allied products
328 Pulp, paper, and paperboard mills
329 Miscellaneous paper and pulp products
337 Paperboard containers and boxes

Printing, publishing, and allied industries
338 Newspaper publishing and printing
339 Printing, publishing, and allied industries, except newspapers

Chemicals and allied products
347 Industrial chemicals
348 Plastics, synthetics and resins, except fibers
349 Synthetic fibers
357 Drugs and medicines
358 Soaps and cosmetics
359 Paints, varnishes, and related products
367 Agricultural chemicals
368 Miscellaneous chemicals
369 Not specified chemicals and allied products

Petroleum and coal products
377 Petroleum refining
378 Miscellaneous petroleum and coal products

Rubber and miscellaneous plastic products
379 Rubber products
387 Miscellaneous plastic products

Leather and leather products
388 Tanned, curried, and finished leather
389 Footwear, except rubber
397 Leather products, except footwear
398 Not specified manufacturing industries

TRANSPORTATION, COMMUNICATIONS, AND OTHER PUBLIC UTILITIES
Transportation
407 Railroads and railway express service
408 Street railways and bus lines
409 Taxicab service
417 Trucking service
418 Warehousing and storage
419 Water transportation
427 Air transportation
428 Pipe lines, except natural gas
429 Services incidental to transportation

Communications
447 Radio broadcasting and television
448 Telephone (wire and radio)
449 Telegraph and miscellaneous communication services

Utilities and sanitary services
467 Electric light and power
468 Electric-gas utilities

469 Gas and steam supply systems
477 Water supply
478 Sanitary services
479 Other and not specified utilities

WHOLESALE AND RETAIL TRADE
Wholesale trade
507 Motor vehicles and equipment
508 Drugs, chemicals, and allied products
509 Dry goods and apparel
527 Food and related products
528 Farm products-raw materials
529 Electrical goods
537 Hardware, plumbing, and heating supplies
538 Not specified electrical and hardware products
539 Machinery equipment and supplies
557 Metals and minerals, not elsewhere classified
558 Petroleum products
559 Scrap and waste materials
567 Alcoholic beverages
568 Paper and its products
569 Lumber and construction materials
587 Wholesalers, not elsewhere classified
588 Not specified wholesale trade

Retail trade
607 Lumber and building material retailing
608 Hardware and farm equipment stores
609 Department and mail order establishments
617 Limited price variety stores
618 Vending machine operators
619 Direct selling establishments
627 Miscellaneous general merchandise stores
628 Grocery stores
629 Dairy products stores
637 Retail bakeries
638 Food stores, not elsewhere classified
639 Motor vehicle dealers
647 Tire, battery, and accessory dealers
648 Gasoline service stations
649 Miscellaneous vehicle dealers
657 Apparel and accessories stores, except shoe stores
658 Shoe stores
667 Furniture and home furnishings stores
668 Household appliances, TV, and radio stores
669 Eating and drinking places
677 Drug stores
678 Liquor stores
679 Farm and garden supply stores
687 Jewelry stores
688 Fuel and ice dealers
689 Retail florists
697 Miscellaneous retail stores
698 Not specified retail trade

FINANCE, INSURANCE, AND REAL ESTATE
707 Banking

708 Credit agencies
709 Security, commodity brokerage, and investment companies
717 Insurance
718 Real estate, including real estate, insurance, law offices

BUSINESS AND REPAIR SERVICES
727 Advertising
728 Services to dwellings and other buildings
729 Commercial research, development, and testing labs
737 Employment and temporary help agencies
738 Business management and consulting services
739 Computer programming services
747 Detective and protective services
748 Business services, not elsewhere classified
749 Automobile services, except repair
757 Automobile repair and related services
758 Electrical repair shops
759 Miscellaneous repair services

PERSONAL SERVICES
769 Private households
777 Hotels and motels
778 Lodging places, except hotels and motels
779 Laundering, cleaning, and other garment services
787 Beauty shops
788 Barber shops
789 Shoe repair shops
797 Dressmaking shops
798 Miscellaneous personal services

ENTERTAINMENT AND RECREATION SERVICES
807 Theaters and motion pictures
808 Bowling alleys, billiard and pool parlors
809 Miscellaneous entertainment and recreation services

PROFESSIONAL AND RELATED SERVICES
828 Offices of physicians
829 Offices of dentists
837 Offices of chiropractors
838 Hospitals
839 Convalescent institutions
847 Offices of health practitioners, not elsewhere classified
848 Health services, not elsewhere classified
849 Legal services
857 Elementary and secondary schools
858 Colleges and universities
859 Libraries
867 Educational services, not elsewhere classified
868 Not specified educational services
869 Museums, art galleries, and zoos
877 Religious organizations
878 Welfare services

879 Residential welfare facilities
887 Nonprofit membership organizations
888 Engineering and architectural services
889 Accounting, auditing, and bookkeeping services
897 Miscellaneous professional and related services

PUBLIC ADMINISTRATION
907 Postal service
917 Federal public administration
927 State public administration
937 Local public administration

II Two-Digit Occupational and Industry Codes

Two-Digit Occupation Classification System.[32]

PROFESSIONAL, TECHNICAL
AND KINDRED WORKERS (001-195)

10. Physicians (medical + osteopathic), Dentists (062,065)
11. Other Medical and Paramedical: chiropractors, optometrists, pharmacists, veterinarians, nurses, therapists, healers, dieticians (except medical and dental technicians, see 16) (061,063,064,071-076)
12. Accountants and Auditors (001)
13. Teachers, Primary and Secondary Schools (including NA type) (141-145)
14. Teachers, College; Social Scientists; Librarians; Archivists (032-036,091-096,102-140)
15. Architects; Chemists; Engineers; Physical and Biological Scientists (002,006-023,042-054)
16. Technicians: Airplane pilots and navigators, designers, draftsmen, foresters and conservationists, embalmers, photographers, radio operators, surveyors, technicians (medical, dental, testing, n.e.c.) (003-005,025,055,080-085,150-173,183,191)
17. Public Advisors: Clergymen, editors and reporters, farm and home management advisors, personnel and labor relations workers, public relations persons, publicity workers, religious, social and welfare workers (024,026,056,086,090,100-101,184,192)
18. Judges; Lawyers (030,031)
19. Professional, technical and kindred workers not listed above (174,175-182,185,190,193-195)

MANAGERS, OFFICIALS AND PROPRIETORS
(EXCEPT FARM) (201-245)

20. Not self-employed
31. Self-employed (unincorporated businesses)

CLERICAL AND KINDRED WORKERS

40. Secretaries, stenographers, typists (370-372,376,391)
41. Other Clerical Workers: agents (n.e.c.) library assistants and attendants, bank tellers, cashiers, bill collectors, ticket, station and express agents, etc., receptionists (301-364,374-375,381-390, 392-395)

SALES WORKERS

45. Retail store salesmen and sales clerks, newsboys, hucksters, peddlers, traveling salesmen, advertising agents and sales- men, insurance agents, brokers, and salesmen, etc. (260-285)

CRAFTSMEN, FOREMEN,
AND KINDRED WORKERS

50. Foremen, n.e.c. (441)
51. Other craftsmen and kindred workers (401-440,442-580)
52. Government protective service workers: firemen, police, marshals, and constables (960-965)

OPERATIVES AND KINDRED WORKERS

61. Transport equipment operatives (701-715)
62. Operatives, except transport (601-695)

LABORERS

70. Unskilled laborers–nonfarm (740-785)
71. Farm laborers and foremen (821-824)

SERVICE WORKERS

73. Private household workers (980-984)
75. Other service workers: barbers, beauticians, manicurists, bartenders, boarding and lodging housekeepers, counter and fountain workers, housekeepers and stewards, waiters, cooks, midwives, practical nurses, babysitters, attendants in physicians' and dentists' offices (901-965 except 960-965 when work for local, state, or federal government)

FARMERS AND FARM MANAGERS

80. Farmers (owners and tenants) and managers (except code 71) (801-802)
MISCELLANEOUS GROUPS
55. Members of armed forces

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[32]Numbers in parentheses represent the 3-digit codes from the 1970 Census of Population.

Two-Digit Industry Classification System.[33]

11. AGRICULTURE, FORESTRY,
    AND FISHERIES (017-028)

21. MINING AND EXTRACTION (047-057)

    MANUFACTURING DURABLES
30. Metal industries (139-169)
31. Machinery, including electrical (177-209)
32. Motor vehicles and other transportation
    equipment (219-238)
33. Other durables (107-138, 239-259)
34. Durables, N.A. what (267)

    MANUFACTURING NONDURABLES
40. Food and kindred products (268-298)
41. Tobacco manufacturing (299)
42. Textile mill products, apparel and other
    fabricated textile products, shoes
    (307-327, 389)
43. Paper and allied products (328-337)
44. Chemical and allied products, petroleum and coal
    products, rubber and miscellaneous plastic
    products (347-387)
45. Other nondurables (388-397)
46. Nondurables, N.A. what (399)
49. Manufacturing, N.A. whether durable or
    nondurable (398)

51. CONSTRUCTION (067-078)

55. TRANSPORTATION (407-429)

56. COMMUNICATION (447-449)

57. OTHER PUBLIC UTILITIES (467-479)

61. RETAIL TRADE (607-698)

62. WHOLESALE TRADE (507-588)

69. TRADE, N.A. WHETHER WHOLESALE
    OR RETAIL (599, 699)

71. FINANCE, INSURANCE, AND REAL
    ESTATE (707-719)

81. REPAIR SERVICE (757-759)

82. BUSINESS SERVICES (727-749)

83. PERSONAL SERVICES (769-799)

84. AMUSEMENT, RECREATION AND RELATED
    SERVICES (807-817)

85. PRINTING, PUBLISHING AND
    ALLIED SERVICES (338-339)

86. MEDICAL AND DENTAL AND HEALTH
    SERVICES, WHETHER PUBLIC
    OR PRIVATE (828-848)

87. EDUCATIONAL SERVICES, WHETHER
    PUBLIC OR PRIVATE (857-868)

88. PROFESSIONAL AND RELATED SERVICES
    OTHER THAN MEDICAL OR EDUCATIONAL
    (849, 869-897)

91. ARMED SERVICES (917 if occ is 600)

92. GOVERNMENT, OTHER THAN MEDICAL
    OR EDUCATIONAL SERVICES
    (927-947, 917 if occ is not 600)

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[33]Numbers in parentheses represent the 3-digit
codes from the 1970 Census of Population.

III One-Digit Occupational and Industry Codes

One-Digit Occupation Classification System.[34]

01. Professional, technical, and kindred workers (10-19)
02. Managers, officials, and proprietors (20)
03. Self-employed businessmen (31)
04. Clerical and sales workers (40-45)
05. Craftsmen, foremen, and kindred workers (50-52)
06. Operatives and kindred workers (61-62)
07. Laborers and service workers, farm laborers (70-75)
08. Farmers and farm managers (80)
09. Miscellaneous (armed services, protective workers) (55)

One-Digit Industry Classification System.[35]

01. Agriculture, forestry, and fisheries (017-028)
02. Mining (047-057)
03. Construction (067-077)
04. Manufacturing (107-398)
05. Transportation, communications, and other public utilities (407-479)
06. Wholesale and retail trade (507-698)
07. Finance, insurance, and real estate (707-718)
08. Business and repair services (727-759)
09. Personal services (769-798)
10. Entertainment and recreation services (807-809)
11. Professional and related services (828-897)
12. Public administration (907-937)

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[35]Numbers in parentheses represent the 3-digit industry codes from the 1970 Census of Population.

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[34]Numbers in parentheses represent 2-digit occupation codes, recoded by the authors based on PSID documentation.